OEC® Workstation

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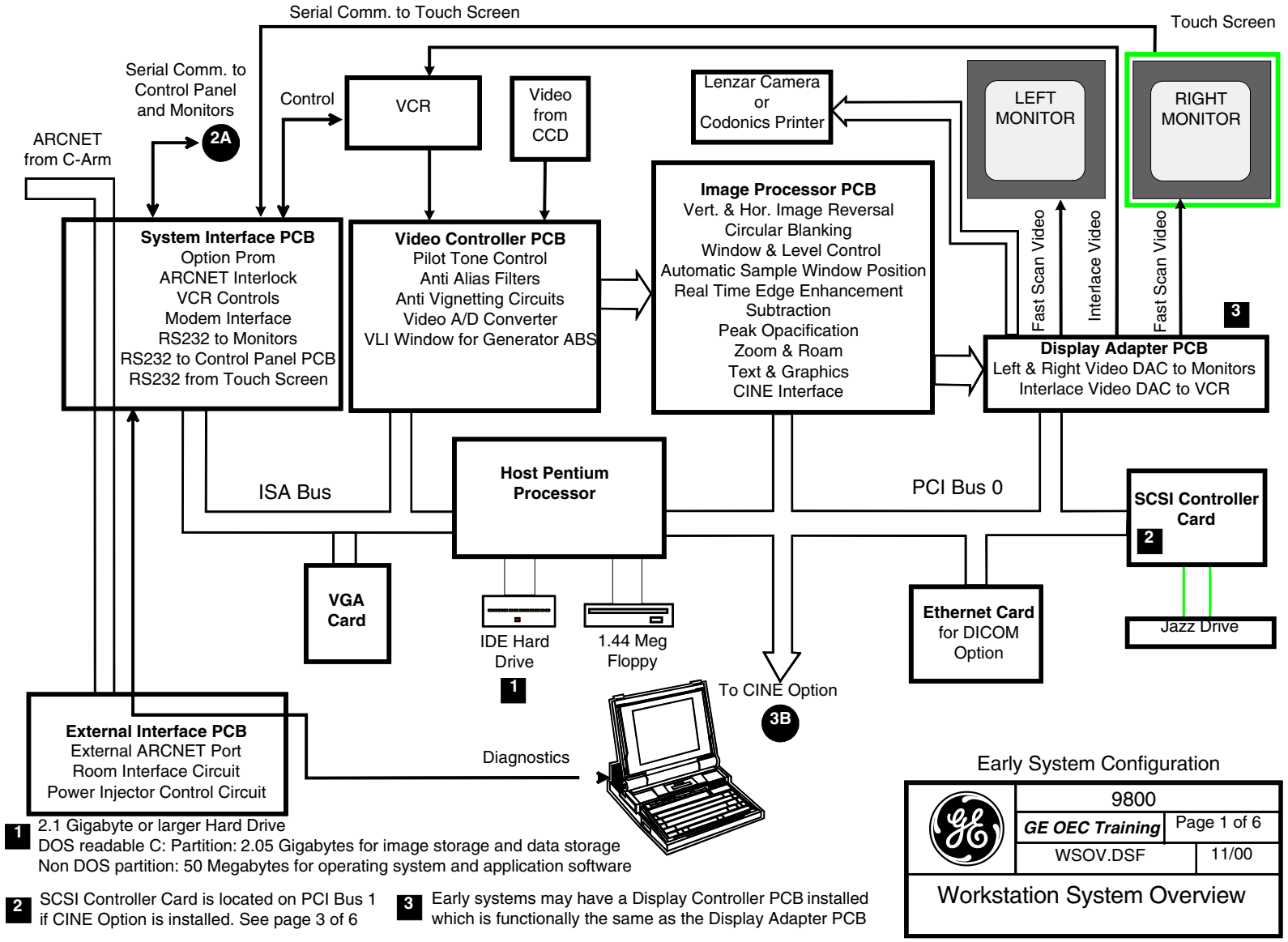
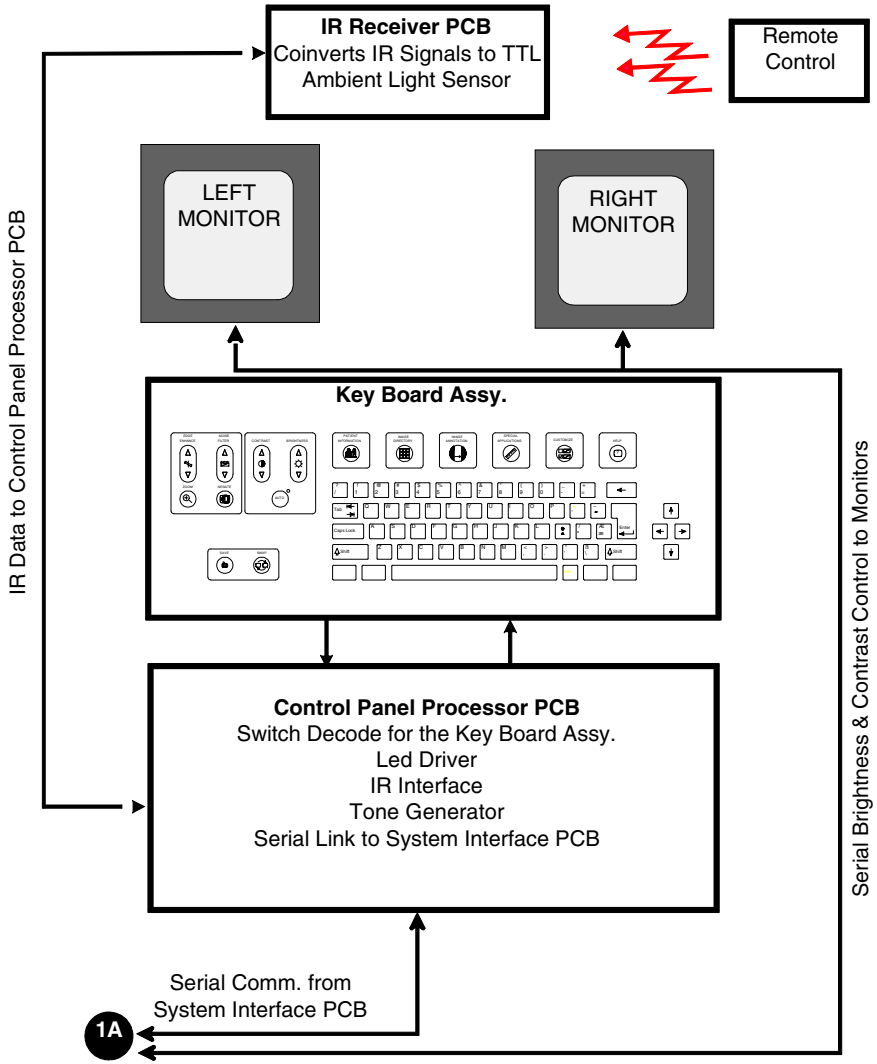


Functional Block 1 –Workstation Overview (1 of 6)



Early System Configuration

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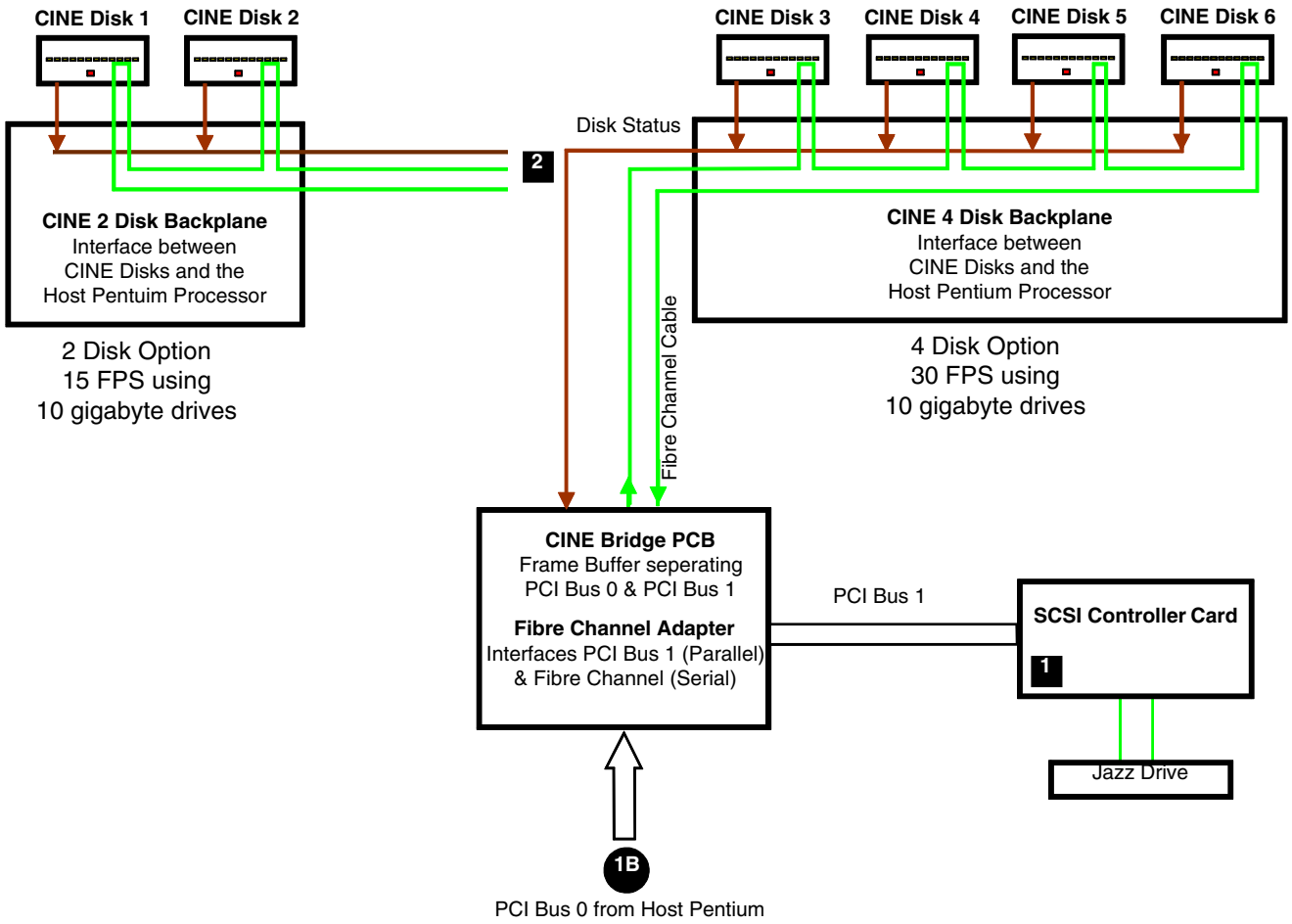
Workstation System Overview Control Panel Processor		

Functional Block 2 – Workstation Overview (2 of 6)



1 SCSI Controller Card is located on PCI Bus 0 if CINE Option is not installed. See page 1 of 6.

2 The CINE 2 or CINE 4 Disk Backplane will be connected to the CINE Bridge PCB depending on system configuration.

Early System Configuration

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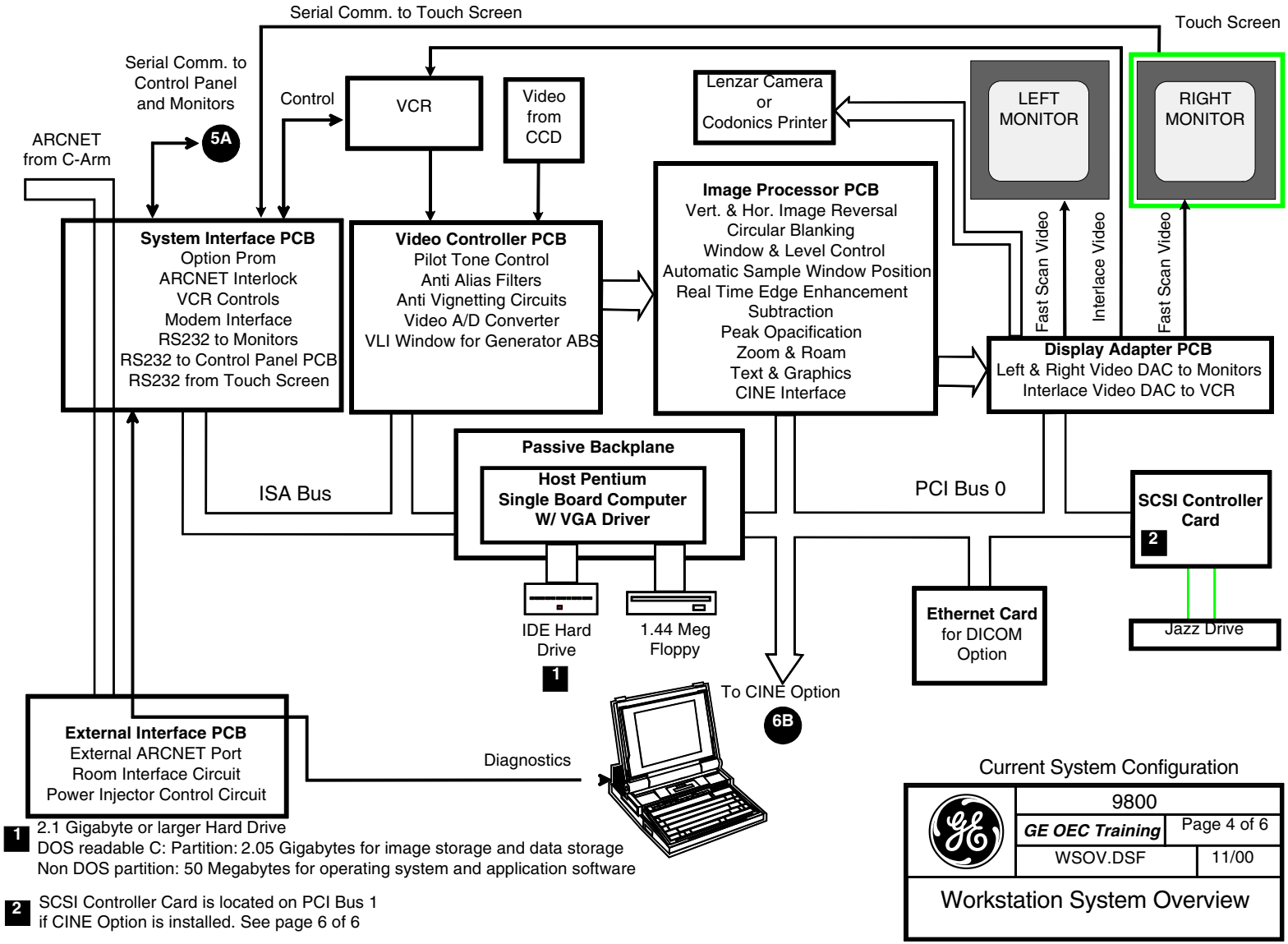
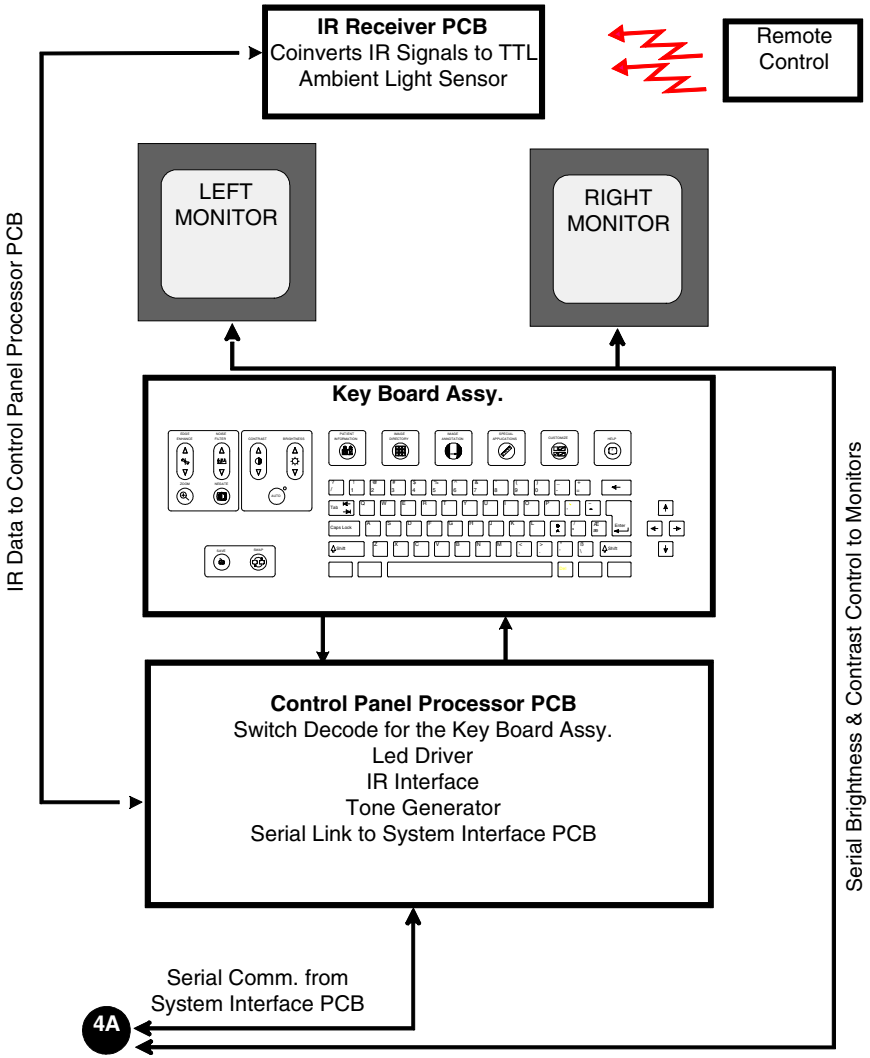
Workstation System Overview Cine Options		

Functional Block 3 – Workstation Overview (3 of 6)



Functional Block 4 – Workstation Overview (4 of 6)



Current System Configuration

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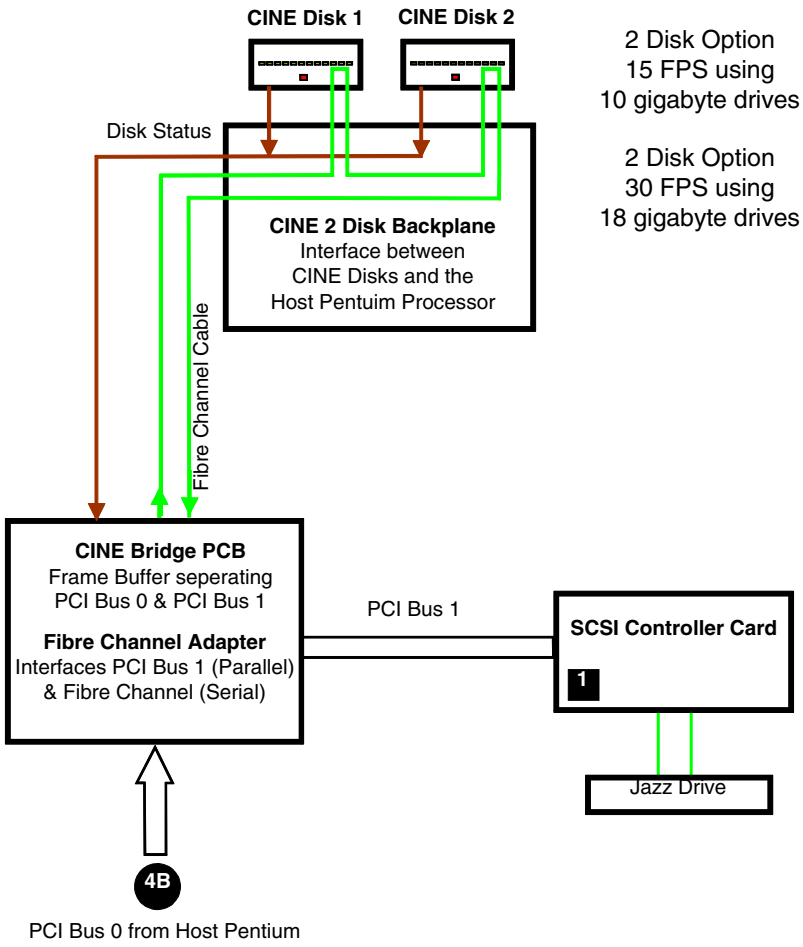
Workstation System Overview Control Panel Processor		

Functional Block 5 – Workstation Overview CPP (5 of 6)



2 Disk Option
15 FPS using
10 gigabyte drives

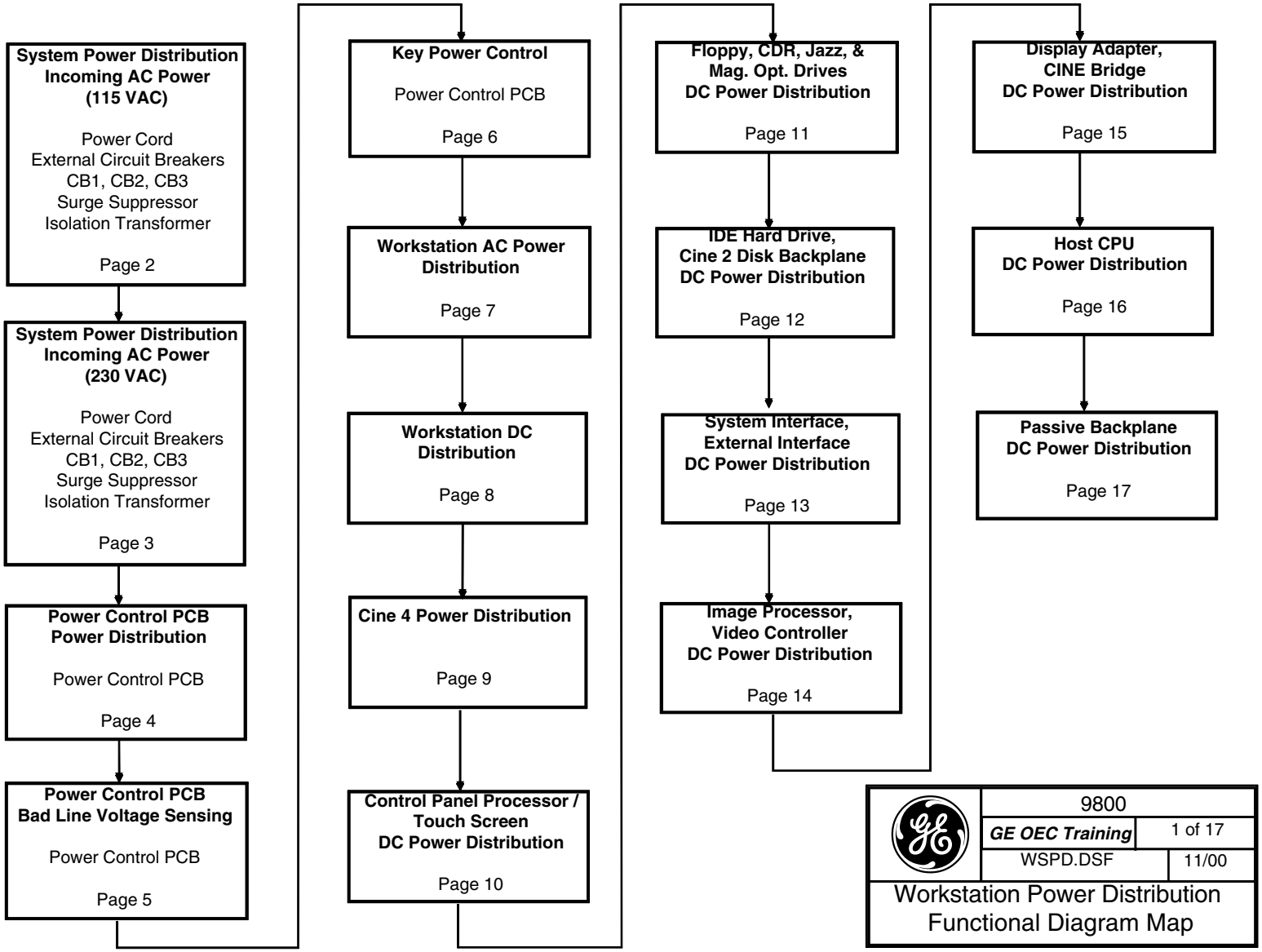
2 Disk Option
30 FPS using
18 gigabyte drives

1 SCSI Controller Card is located on PCI Bus 0 if CINE Option is not installed. See page 4 of 6.

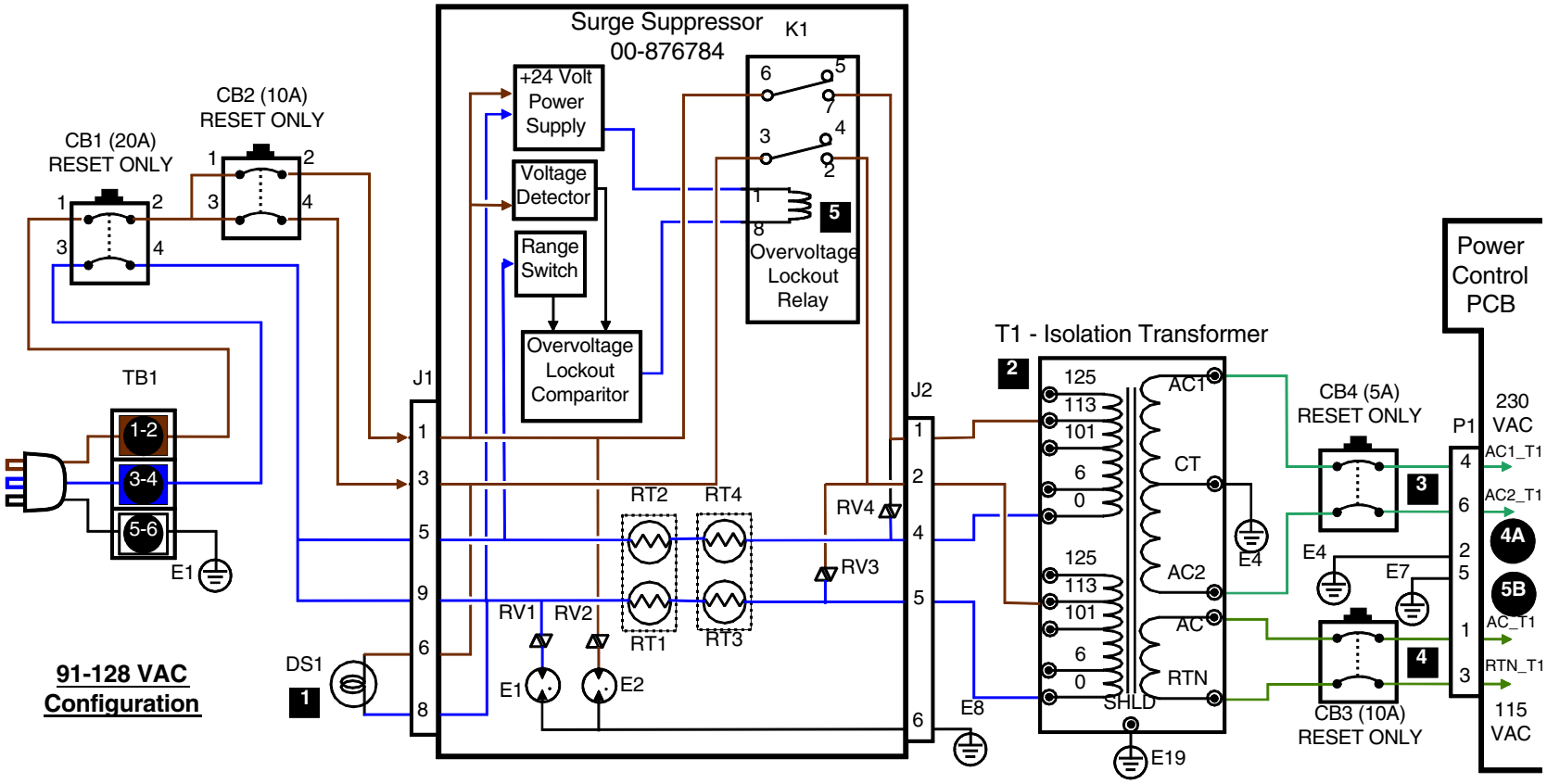
Current System Configuration

	9800
	GE OEC Training Page 6 of 6
	WSOV.DSF 11/00
Workstation System Overview Cine Options	

Functional Block 6 – Workstation Overview Cine Options (6 of 6)



Functional Block 7 – Workstation Power Distribution (1 of 17)



1 DS1 turns on when the system is connected to facility power.

2 Strap T1 to match facility AC as follows:

Input VAC	91-98	98-104	104-110	110-116	116-122	122-128
T1 Taps	**101/6**	**101/0**	**113/6**	**113/0**	**125/6**	**125/0**

3 230 VAC

4 115 VAC

5 K1 will not energize if the line voltage is excessively high.

	9800	
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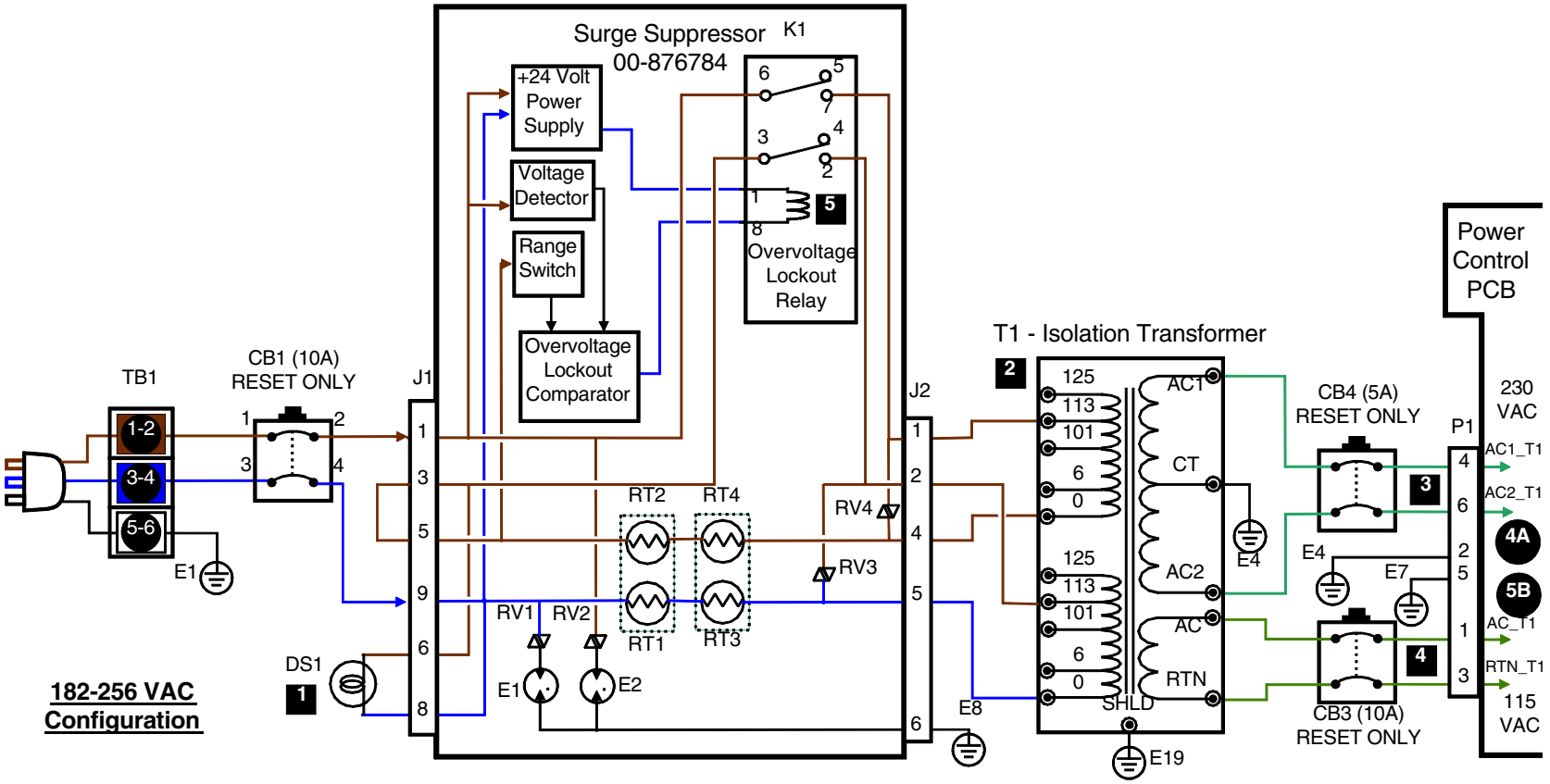
	WSPD.DSF	11/00
System Power Distribution Incoming AC Power (115 VAC)		

Functional Block 8 – System Power Distribution Incoming AC Power (2 of 17)



1 DS1 turns on when the system is connected to facility power.

2 Strap T1 to match facility AC as follows:

Input VAC	182-196	196-208	208-220	220-232	232-244	244-256
T1 Taps	**101/6**	**101/0**	**113/6**	**113/0**	**125/6**	**125/0**

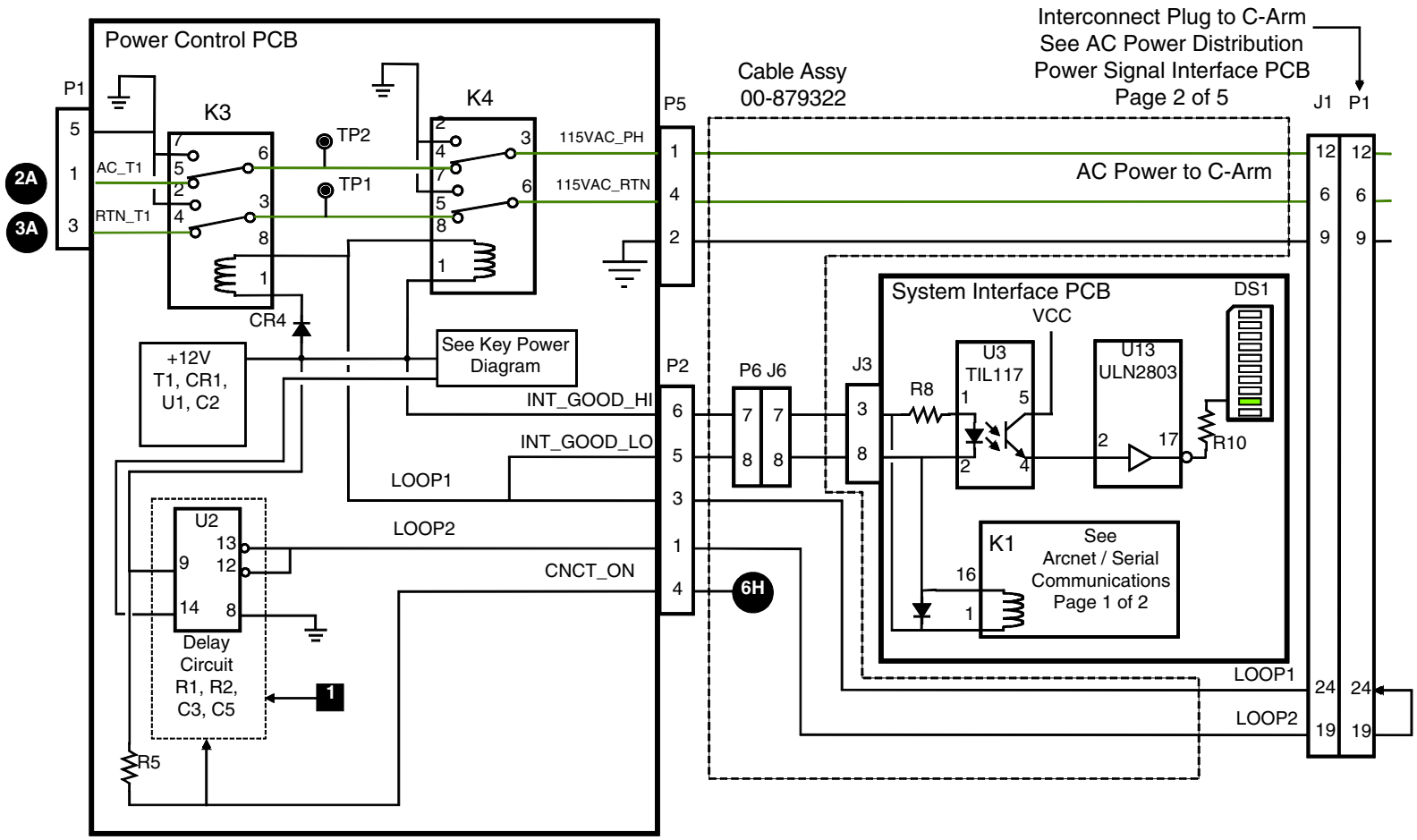
3 230 VAC

4 115 VAC

5 K1 will not energize if the line voltage is excessively high.

	9800
GE OEC Training	3 of 17
WSPD.DSF	11/00
System Power Distribution Incoming AC Power (230 VAC)	

Functional Block 9 – System Power Distribution Incoming AC Power (3 of 17)



1 From Bad Line Voltage Alarm Circuit.
If the bad line voltage alarm is activated,
U2 pins 12 &13 will not go low,
preventing AC power from going to the generator

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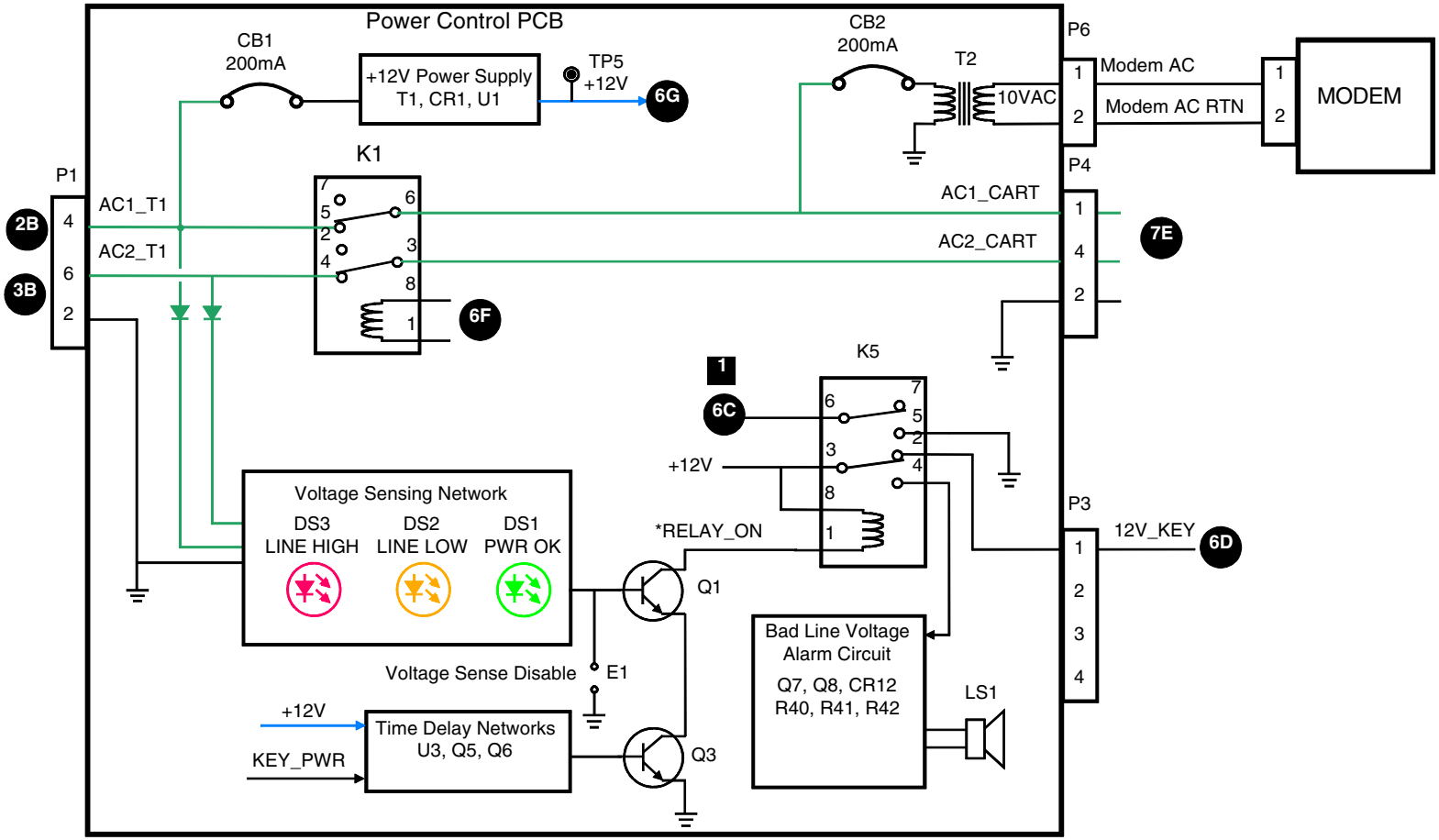
	GE OEC Training	4 of 17
	WSPD.DSF	11/00
Power Control PCB Power Distribution		

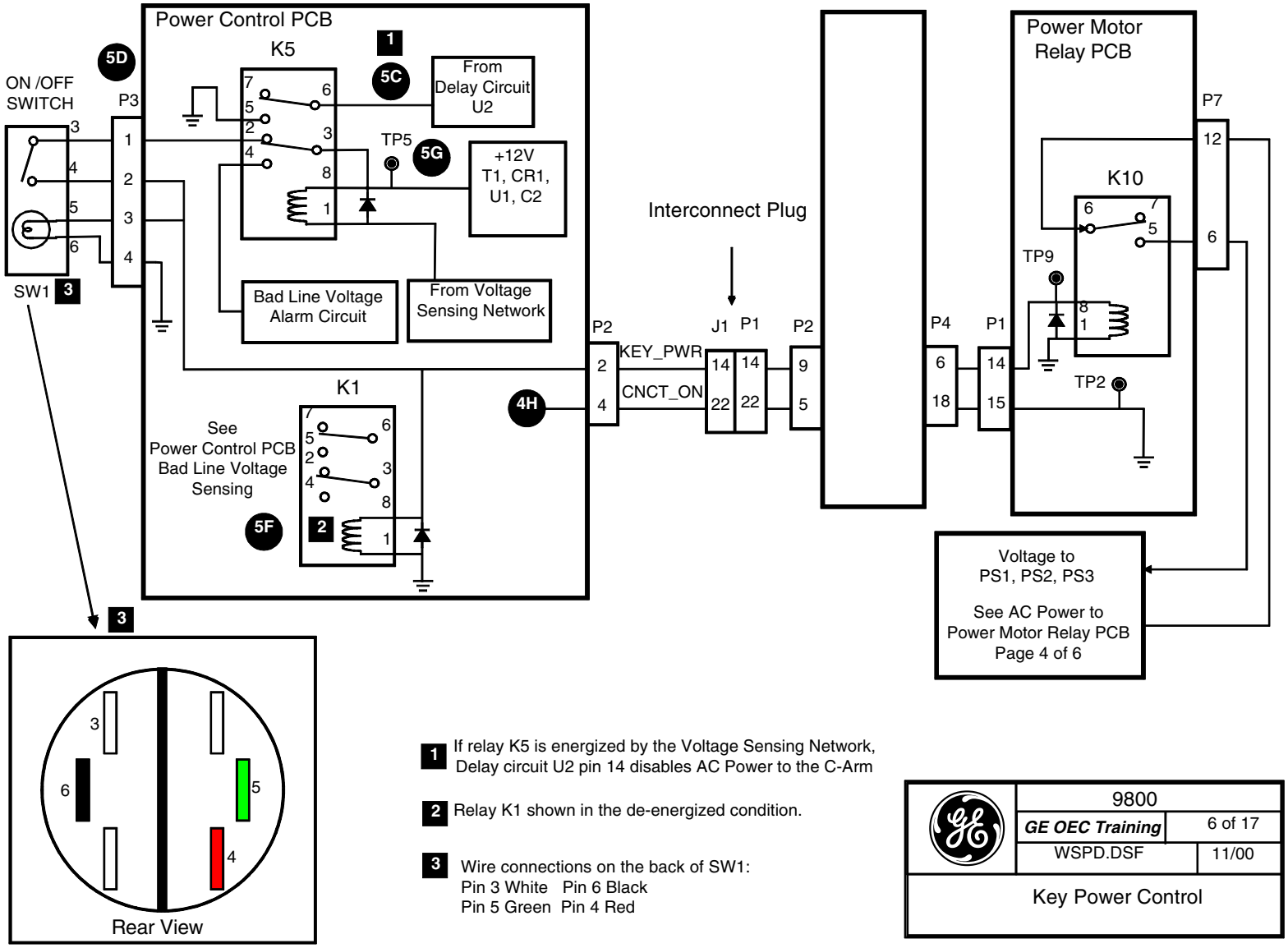
Functional Block 10 – Power Control PCB Power Distribution (4 of 17)



1 To Delay Circuit U2.
If the bad line voltage alarm is activated,
AC power is prevented from going to the generator

9800	
GE OEC Training	5 of 17
WSPD.DSF	11/00
Power Control PCB Bad Line Voltage Sensing	

Functional Block 11 – Power Control PCB Bad Line Voltage Sensing (5 of 17)



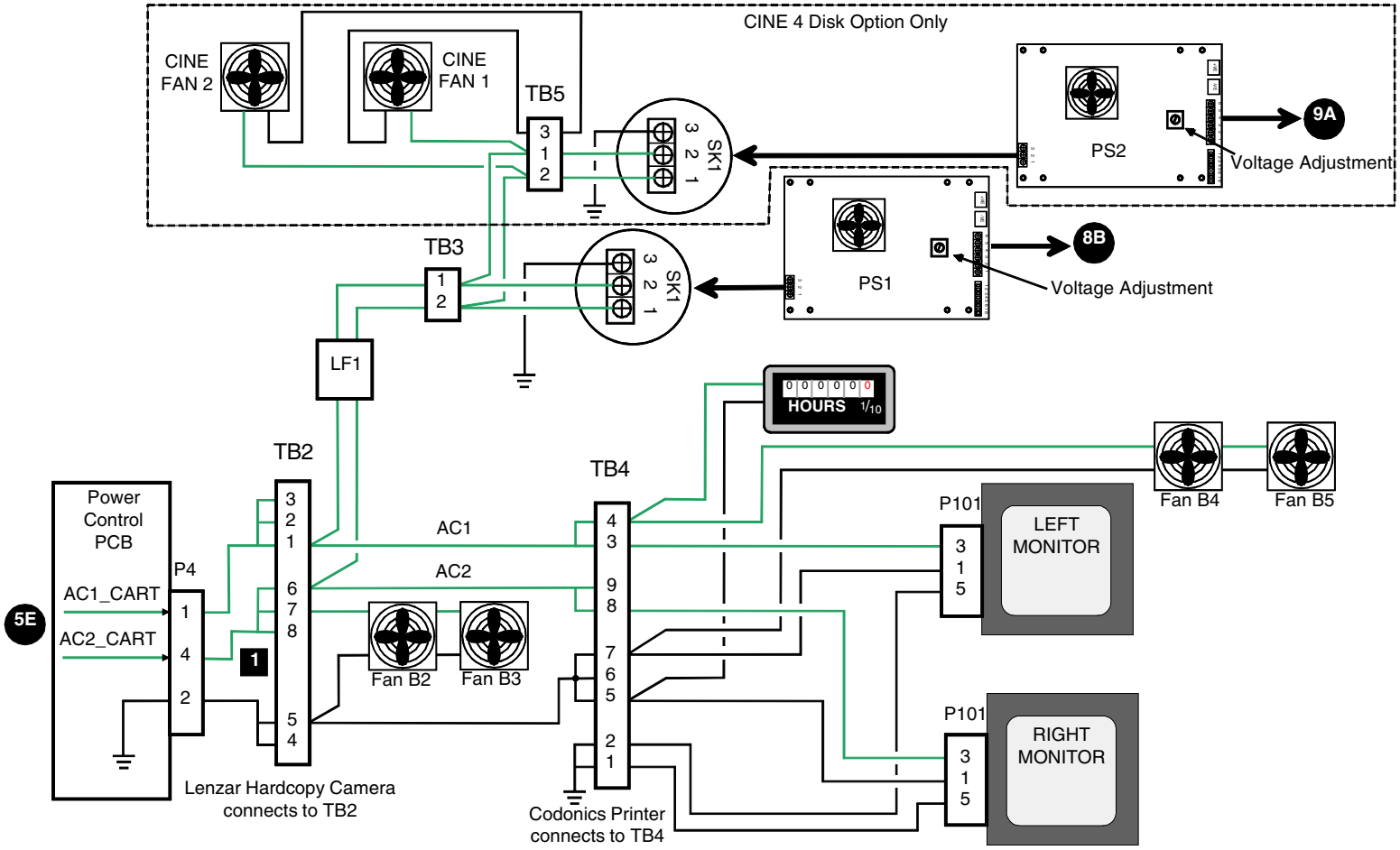
1 If relay K5 is energized by the Voltage Sensing Network, Delay circuit U2 pin 14 disables AC Power to the C-Arm

2 Relay K1 shown in the de-energized condition.

3 Wire connections on the back of SW1:
Pin 3 White Pin 6 Black
Pin 5 Green Pin 4 Red

9800	
GE OEC Training	6 of 17
WSPD.DSF	11/00
Key Power Control	

Functional Block 12 – Key Power Control (6 of 17)



1 With Arches option TB2 will have these additional power connections:
Tracker Computer Enclosure power to the attaches to TB2 pins 8 & 2.
Power Supply PS3 for Flat Panel Display attaches to TB2 pins 1 & 7.
Power Supply PS4 inside of Arches enclosure attaches to TB2 pins 8 & 2.
Ground connections to these power supplies are all attached to Ground connection E6 (not shown).

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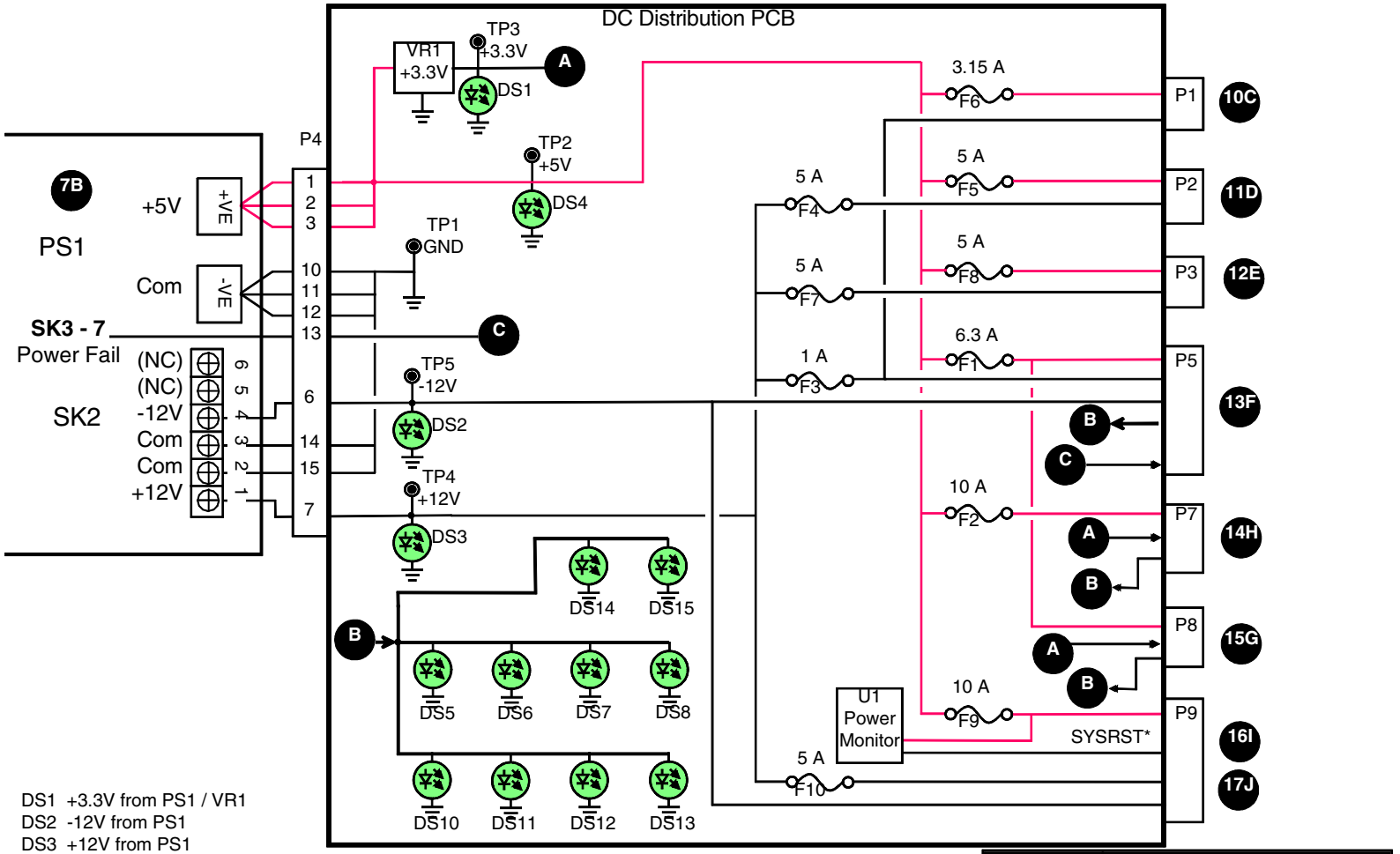
GE OEC Training	7 of 17
WSPD.DSF	11/00
Workstation AC Power Distribution	

Functional Block 13 – Workstation AC Power Distribution (7 of 17)



DS1 +3.3V from PS1 / VR1
DS2 -12V from PS1
DS3 +12V from PS1
DS4 +5V from PS1

DS5 sensed +5V from Vid. Cont.
DS6 sensed +3.3V from Vid. Cont.
DS7 sensed +5V from IP
DS8 sensed +3.3V from IP

DS10 sensed +5V from Disp. Adapter
DS11 sensed +3.3V from Disp. Adapter
DS12 sensed +3.3V from Cine Bridge
DS13 sensed +5V from Cine Bridge

DS14 sensed +5V from CPP
DS15 sensed +12V from CPP

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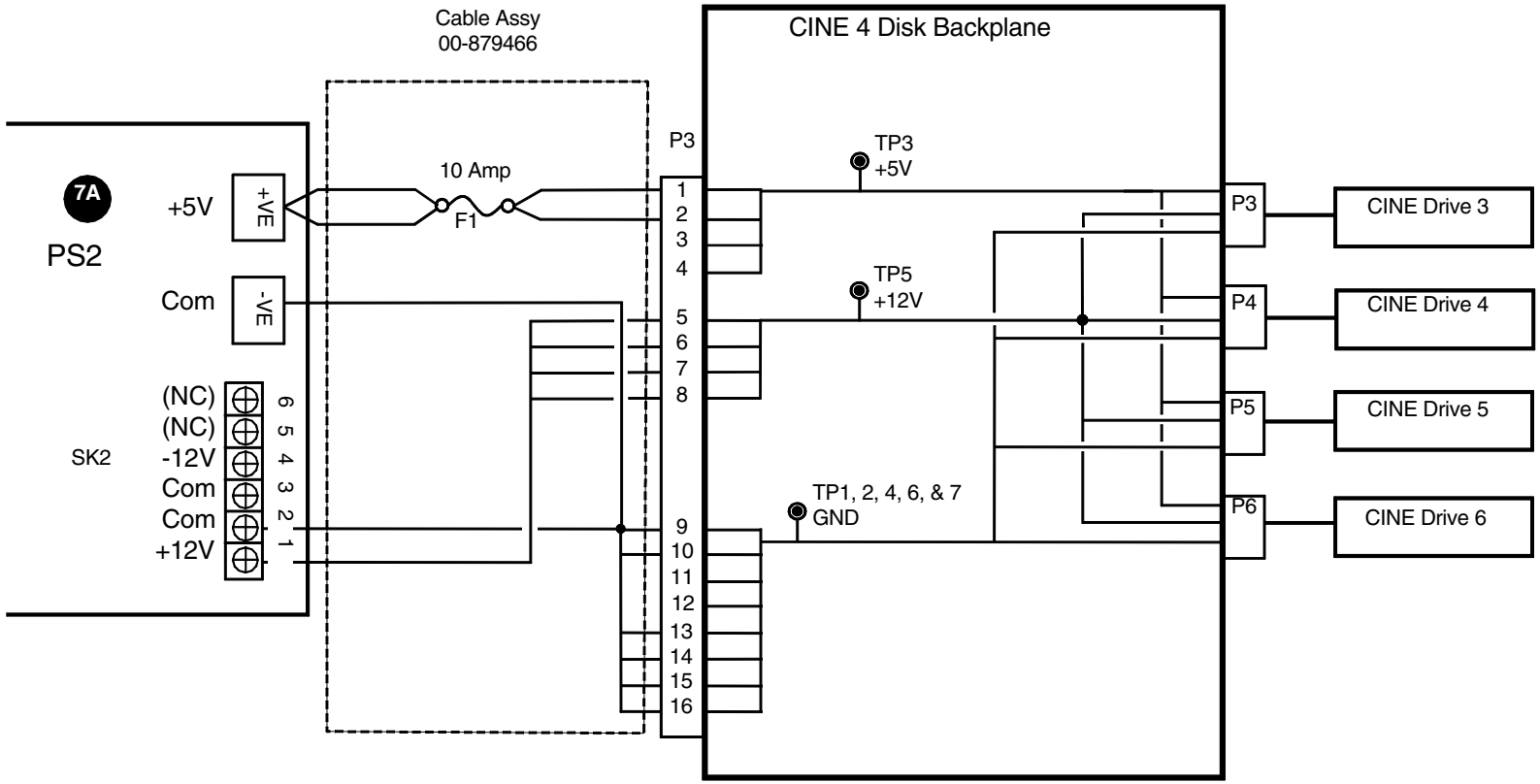
GE OEC Training	8 of 17
WSPD.DSF	11/00
Workstation DC Distribution	

Functional Block 14 – Workstation DC Distribution (8 of 17)



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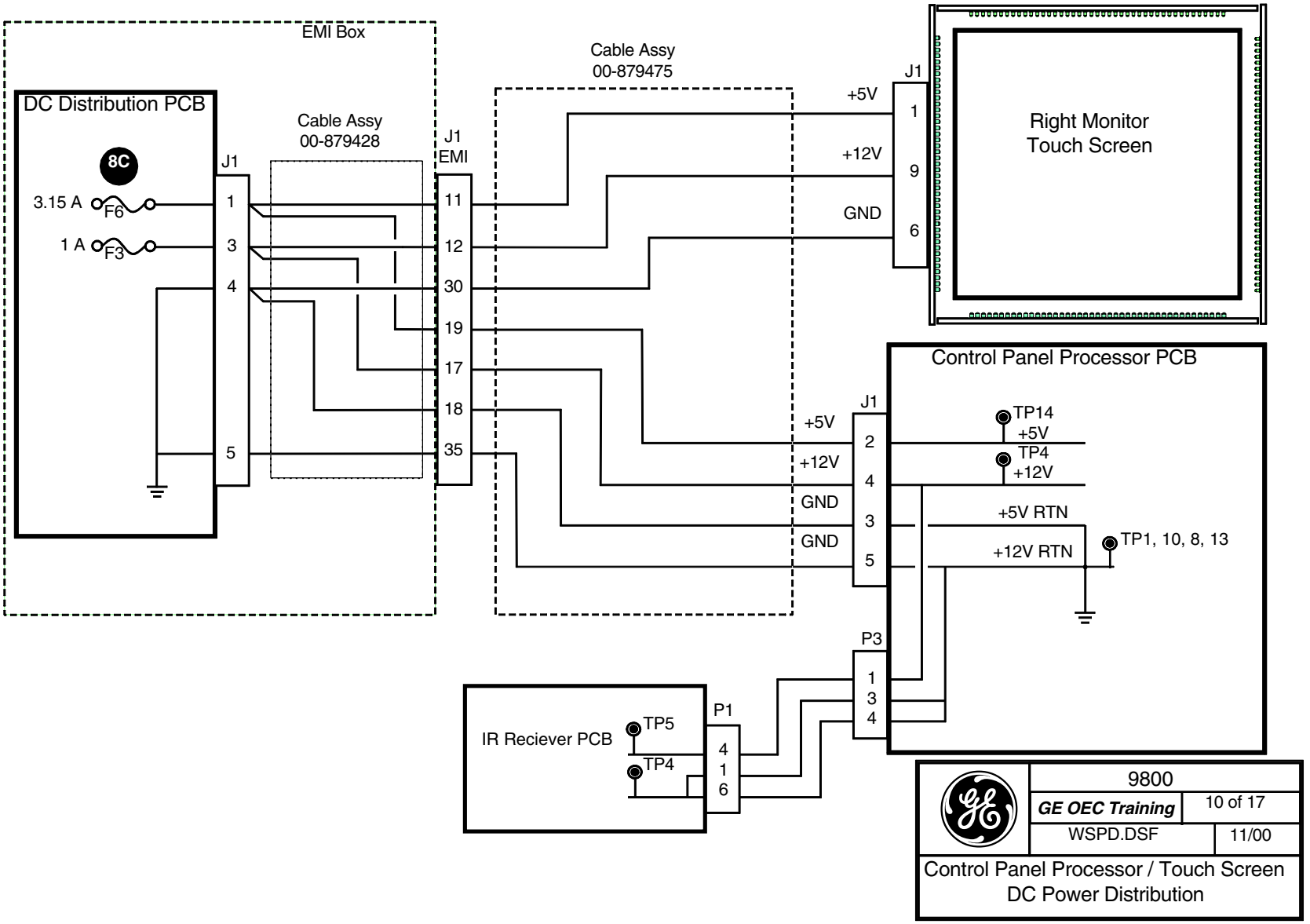
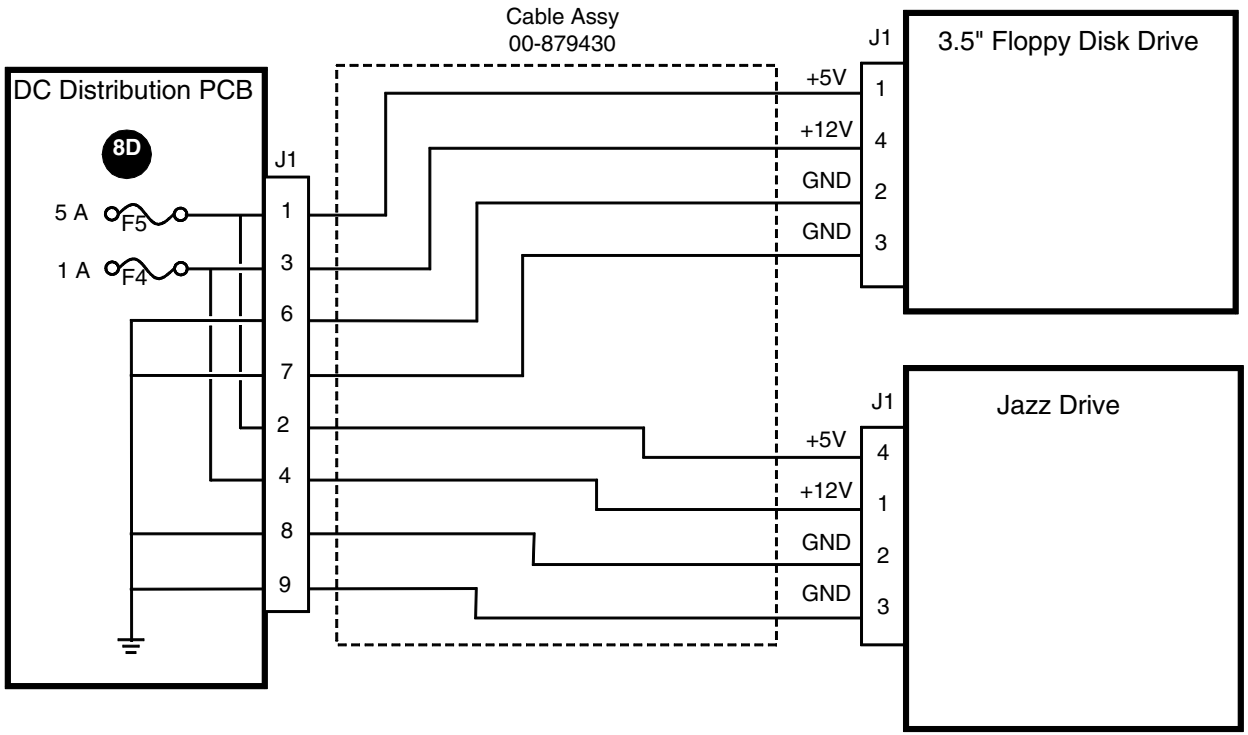
GE OEC Training	9 of 17
WSPD.DSF	11/00
Cine 4 Power Distribution	

Functional Block 15 – Cine 4 Power Distribution (9 of 17)



Functional Block 16 – Control Panel Processor Touch Screen DC Power Distribution (10 of 17)



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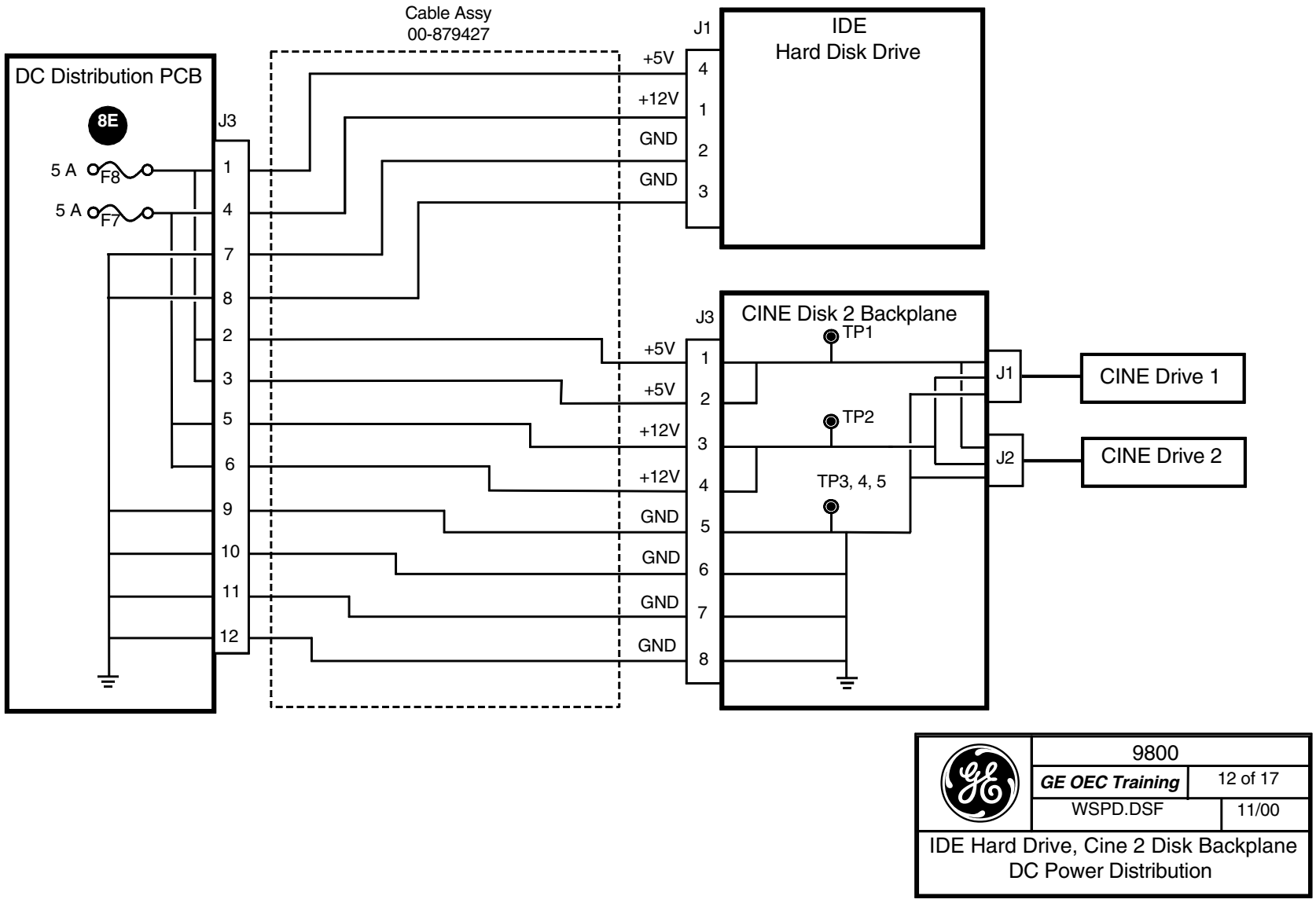
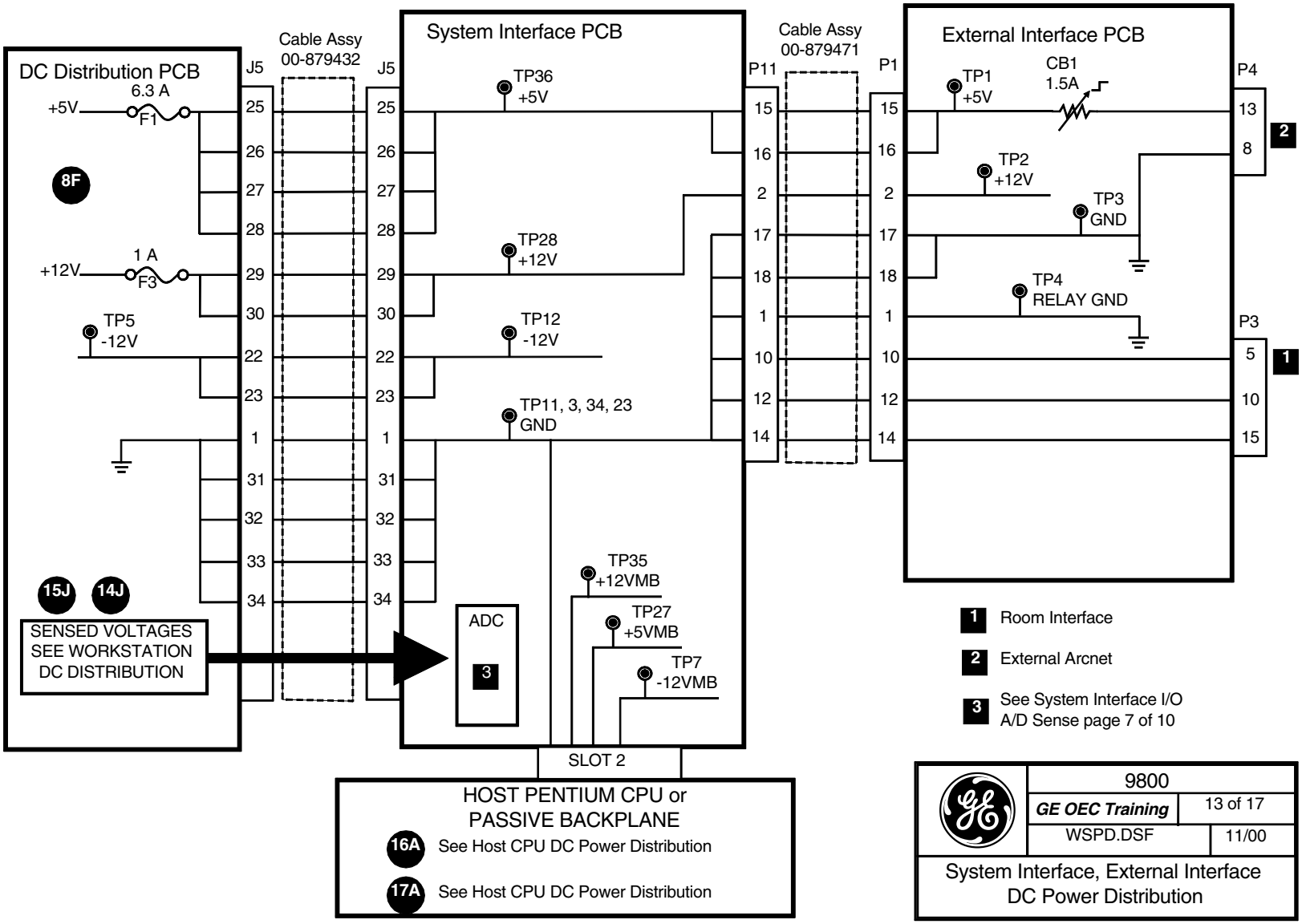
	GE OEC Training 11 of 17
	WSPD.DSF 11/00
Floppy & Jazz Drives DC Power Distribution	

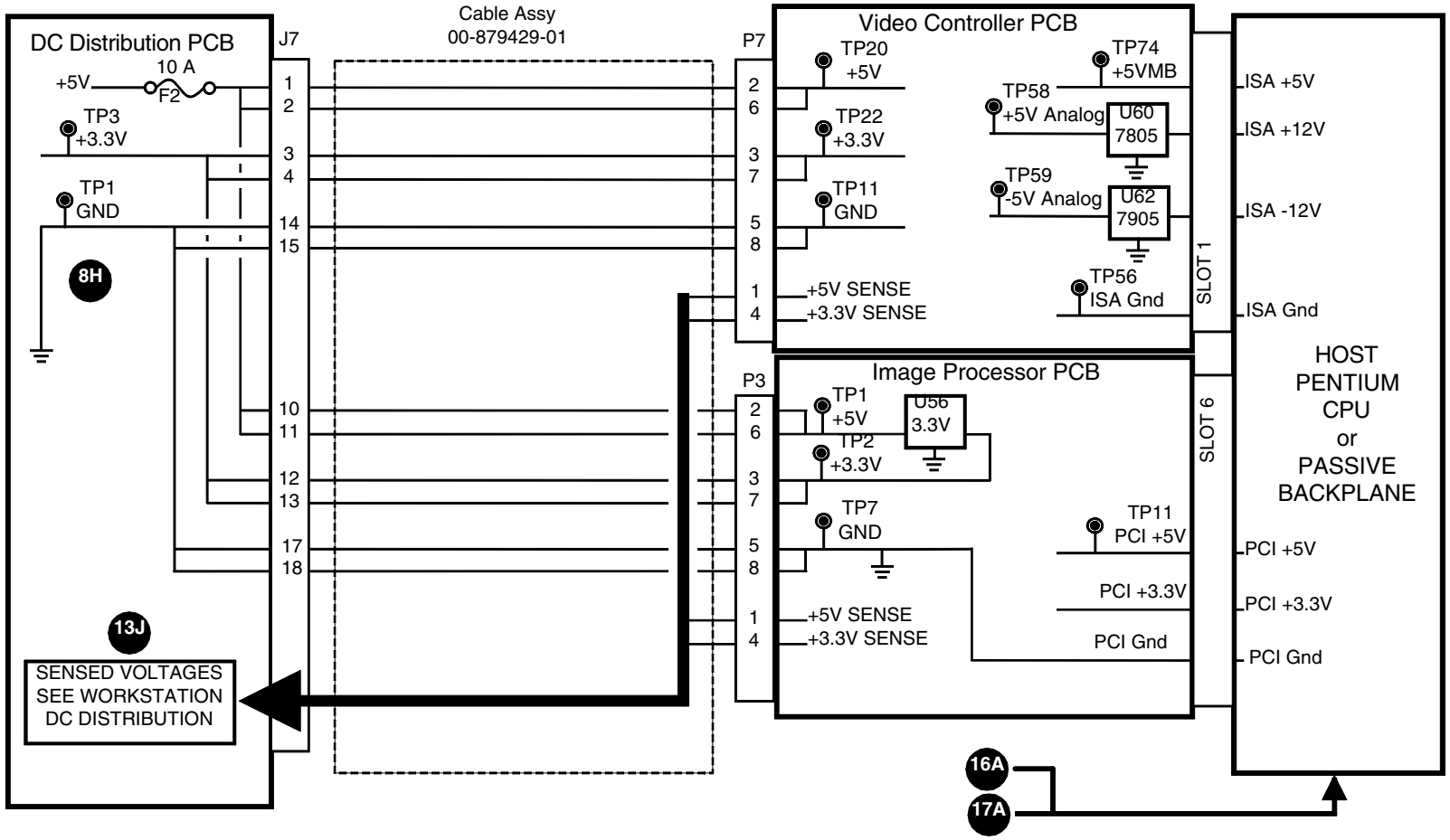
Functional Block 17 – Floppy & Jaz Drives DC Power Distribution (11 of 17)



Functional Block 18 – IDE Hard Drive, Cine 2 Disk Backplane DC Power Distribution (12 of 17)



Functional Block 19 – System Interface, External Interface DC Power Distribution (13 of 17)



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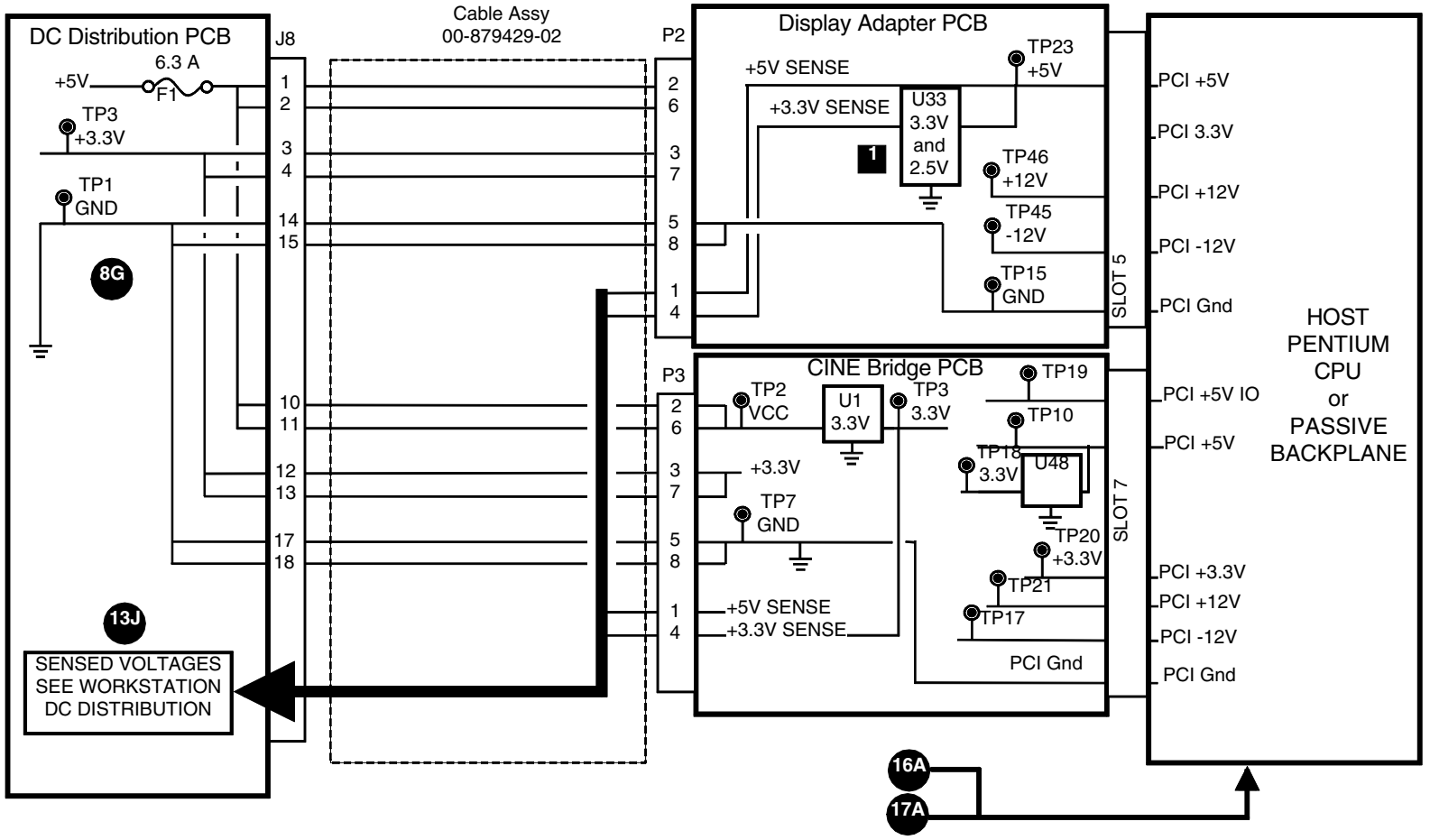
WSPD.DSF	11/00
Image Processor, Video Controller DC Power Distribution	

Functional Block 20 – Image Processor, Video Controller DC Power Distribution (14 of 17)



1 The Display Controller PCB uses a 3.3 volt regulator only.
The Display Adapter PCB can ues a 3.3volt and a 2.5 Volt regulator.
The 2.5 volt regulator voltage is not sensed by the System Interface PCB.

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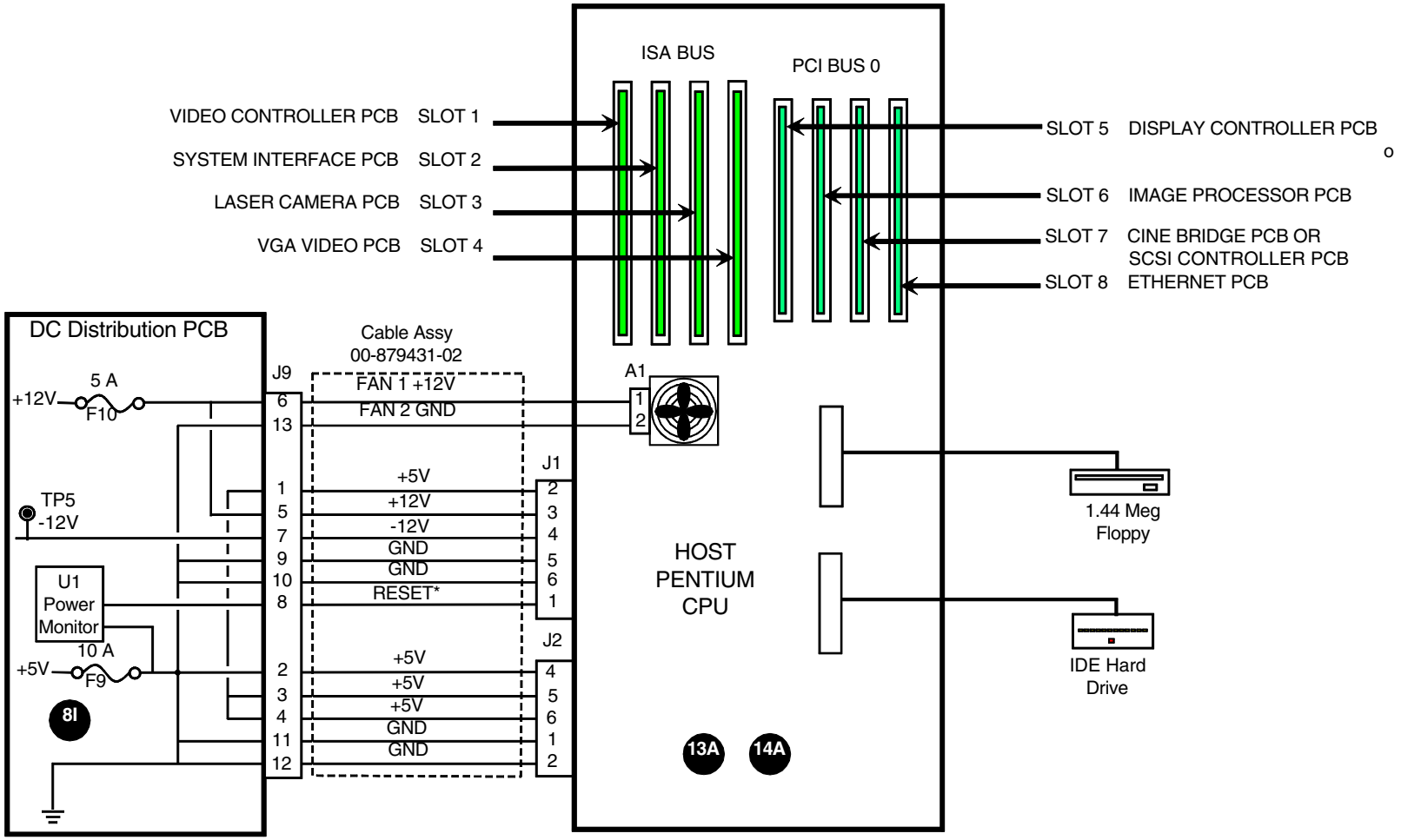
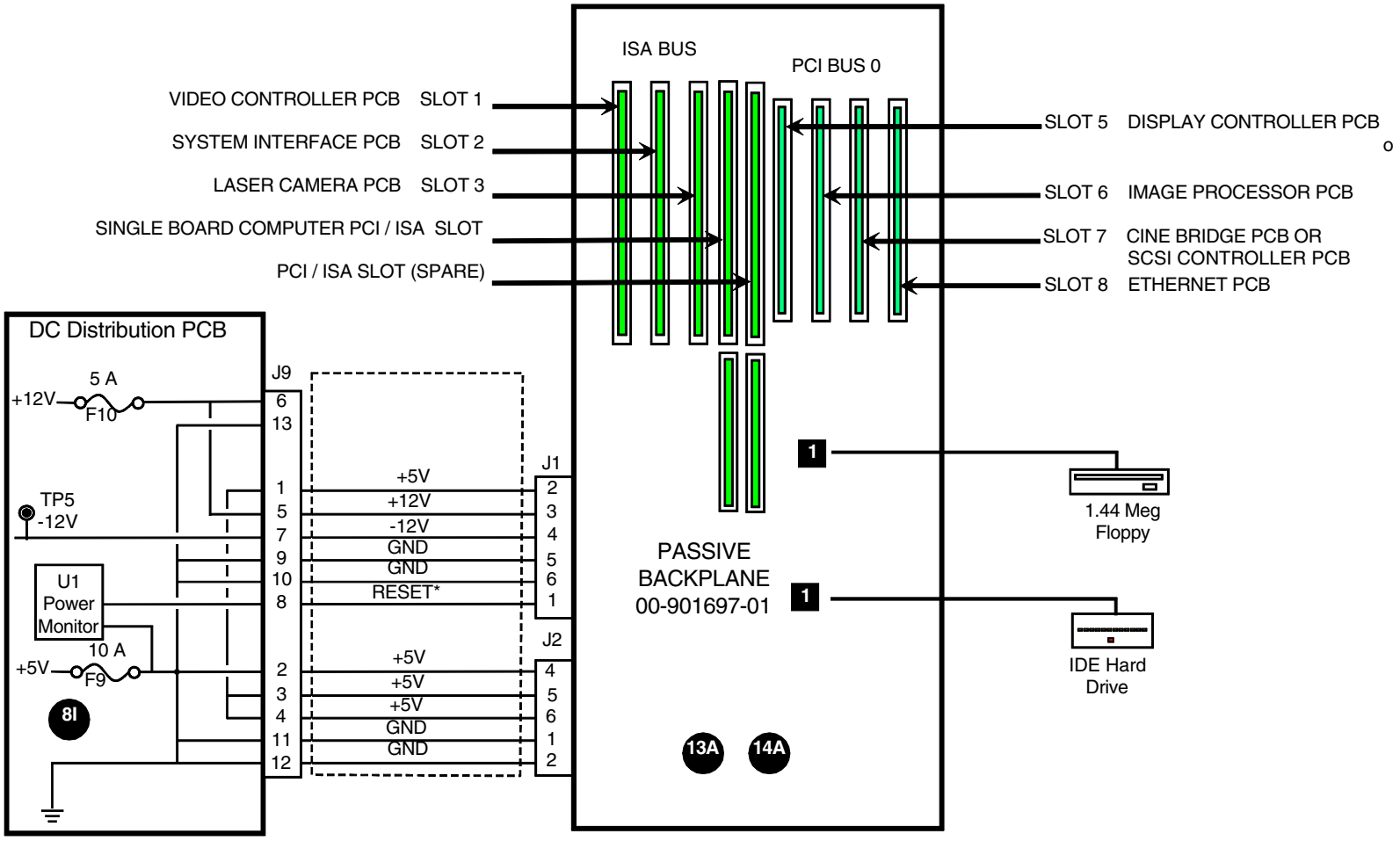
	GE OEC Training	15 of 17
	WSPD.DSF	11/00
Display Controller, Cine Bridge DC Power Distribution		

Functional Block 21 – Display Controller, Cine Bridge DC Power Distribution (15 of 17)



	9800
	GE OEC Training 16 of 17
	WSPD.DSF 11/00
Host CPU DC Power Distribution	

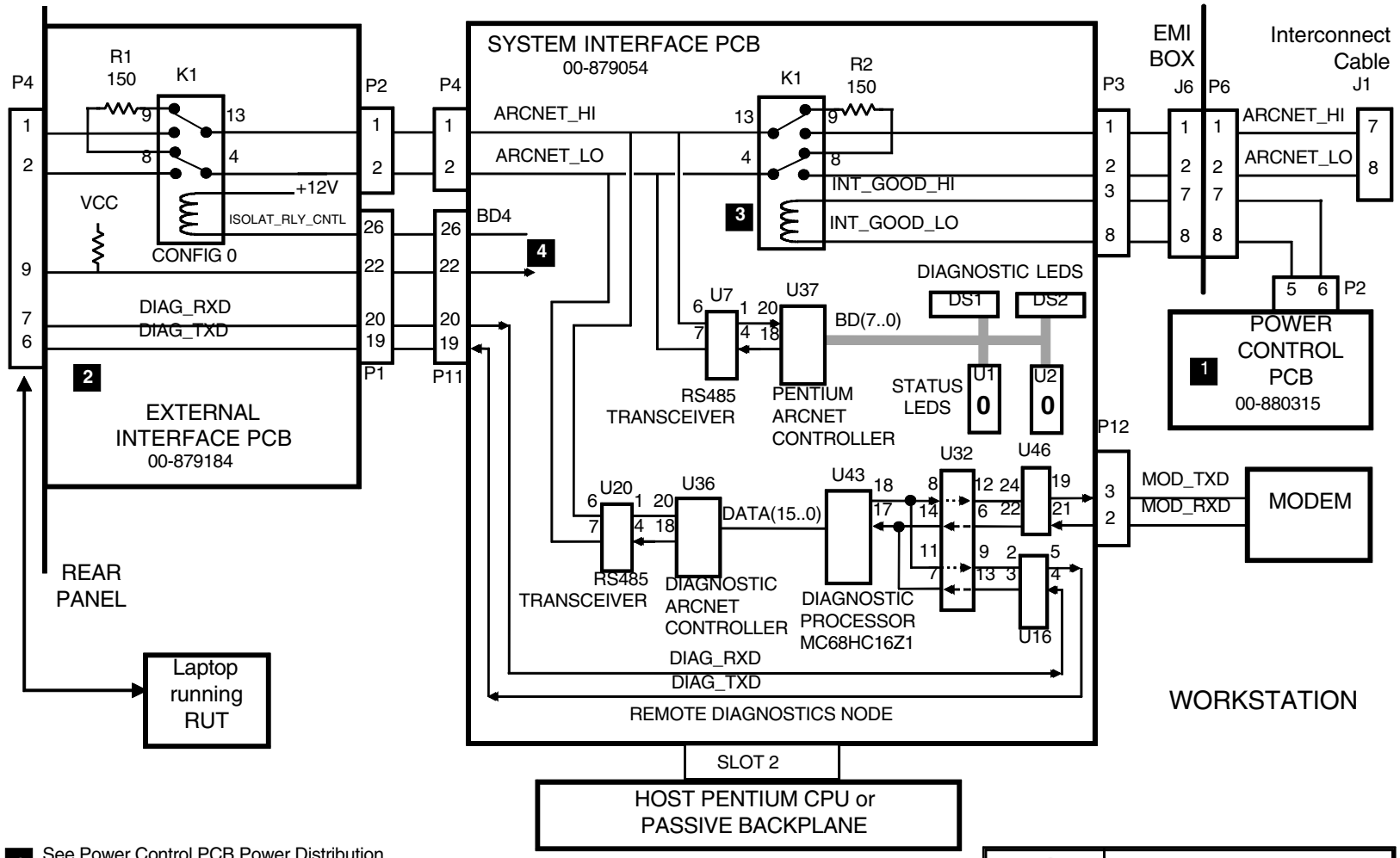
Functional Block 22 – Host CPU DC Power Distribution (16 of 17)



1 See Single Board Computer Functional Diagram.

	9800	
	GE OEC Training	17 of 17
	WSPD.DSF	11/00
Passive Backplane DC Power Distribution		

Functional Block 23 – Passive Backplane DC Power Distribution (17 of 17)



1 See Power Control PCB Power Distribution Page 4 of 16

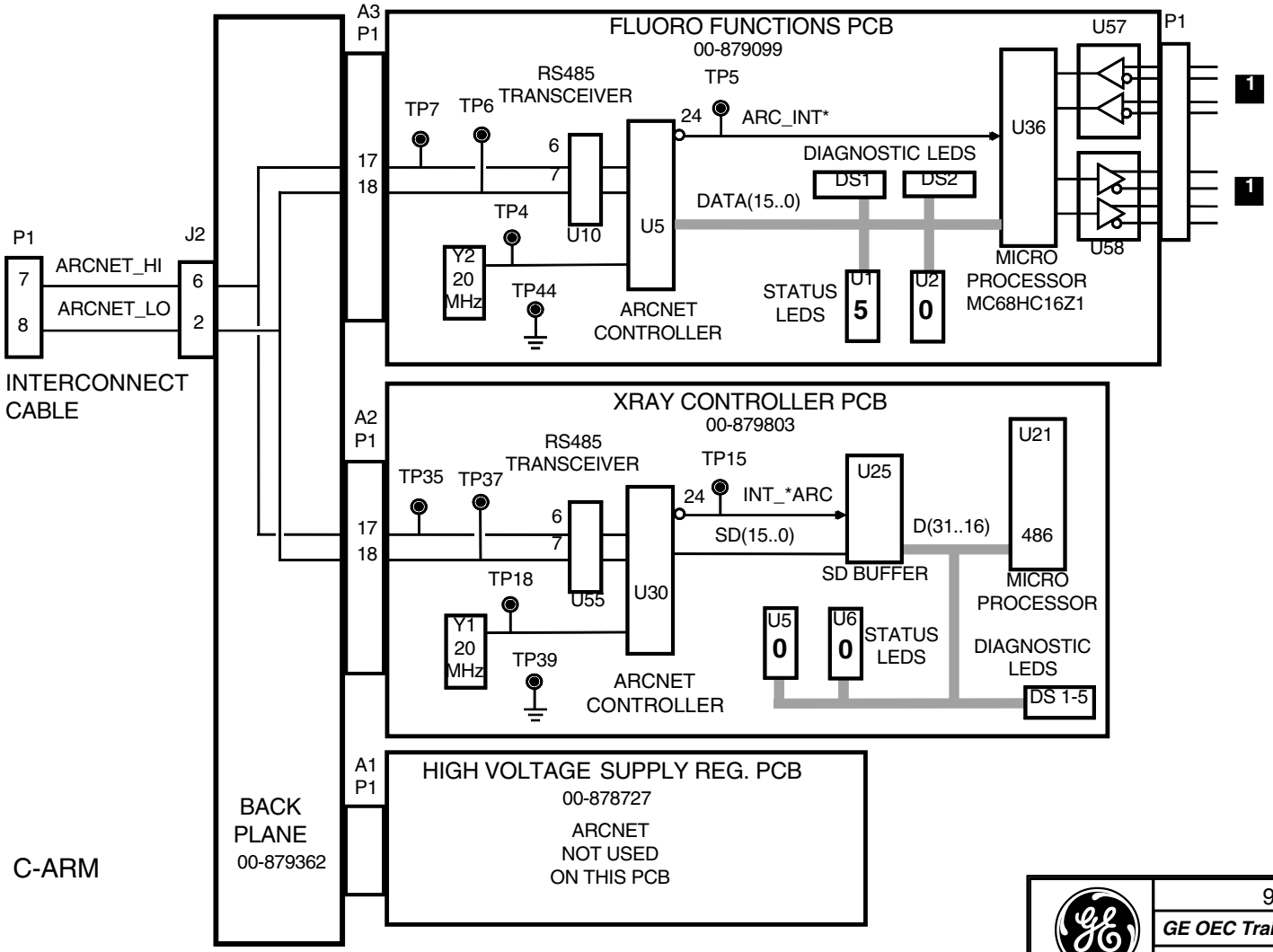
2 See Workstation Remote Diagnostics Interface Page 8 of 11

3 Shown in Workstation Standalone condition. Activated by CNCT_ON circuit. See Power Control PCB Power Distribution Page 4 of 16.

4 Diagnostic Processor U43 monitors the CONFIG 0 line and activates Relay K1 on the External Interface PCB using the BD4 line when an external ARCNET cable is attached.

	9800	
	GE OEC Training	Page 1 of 4
	ARC_NET.DSF	11/00
Arcnet Communications Functional Diagram		

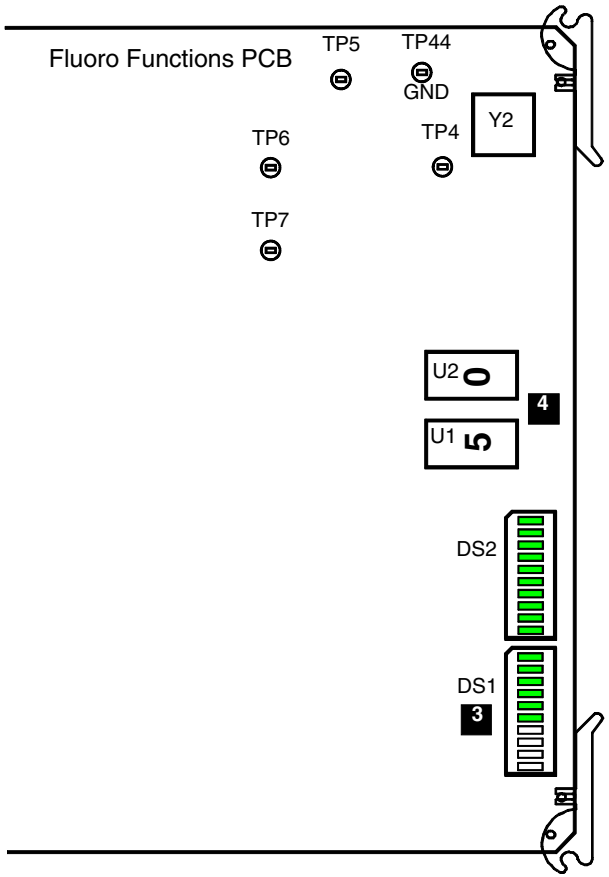
Functional Block 24 – ARCNET Communications (1 of 4)

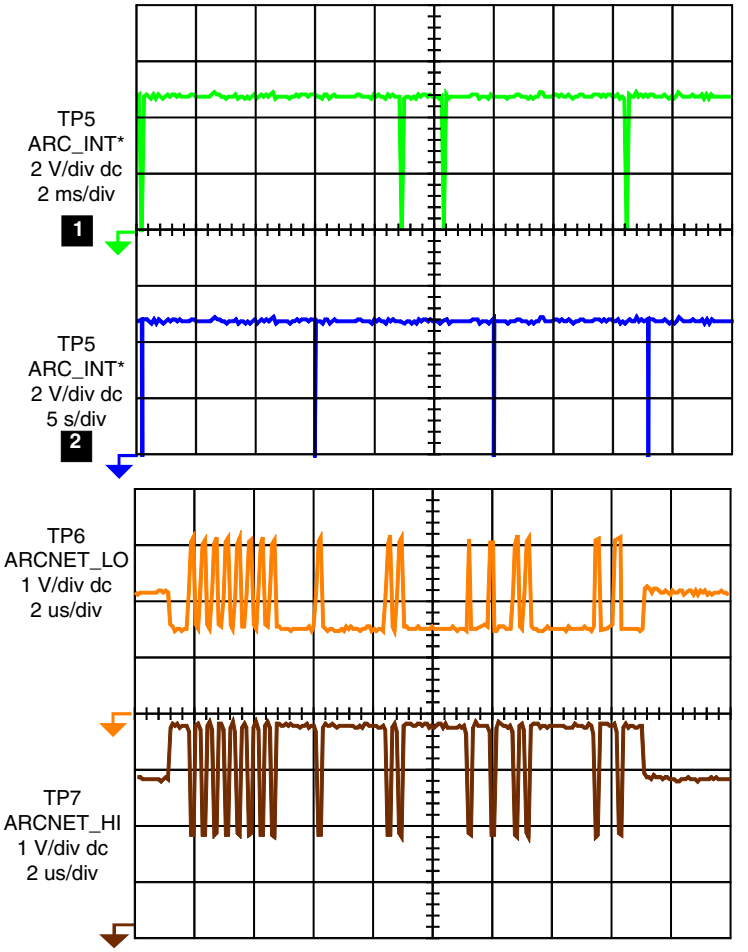


1 See Control Panel & Fluoro Functions Communications Diagram Page 3 of 3

	9800	
	GE OEC Training	Page 2 of 4
	ARC_NET.DSF	11/00
Arcnet Communications Functional Diagram		

Functional Block 25 – ARCNET Communications (2 of 4)





1 Active condition, buttons pressed on Control Panel.

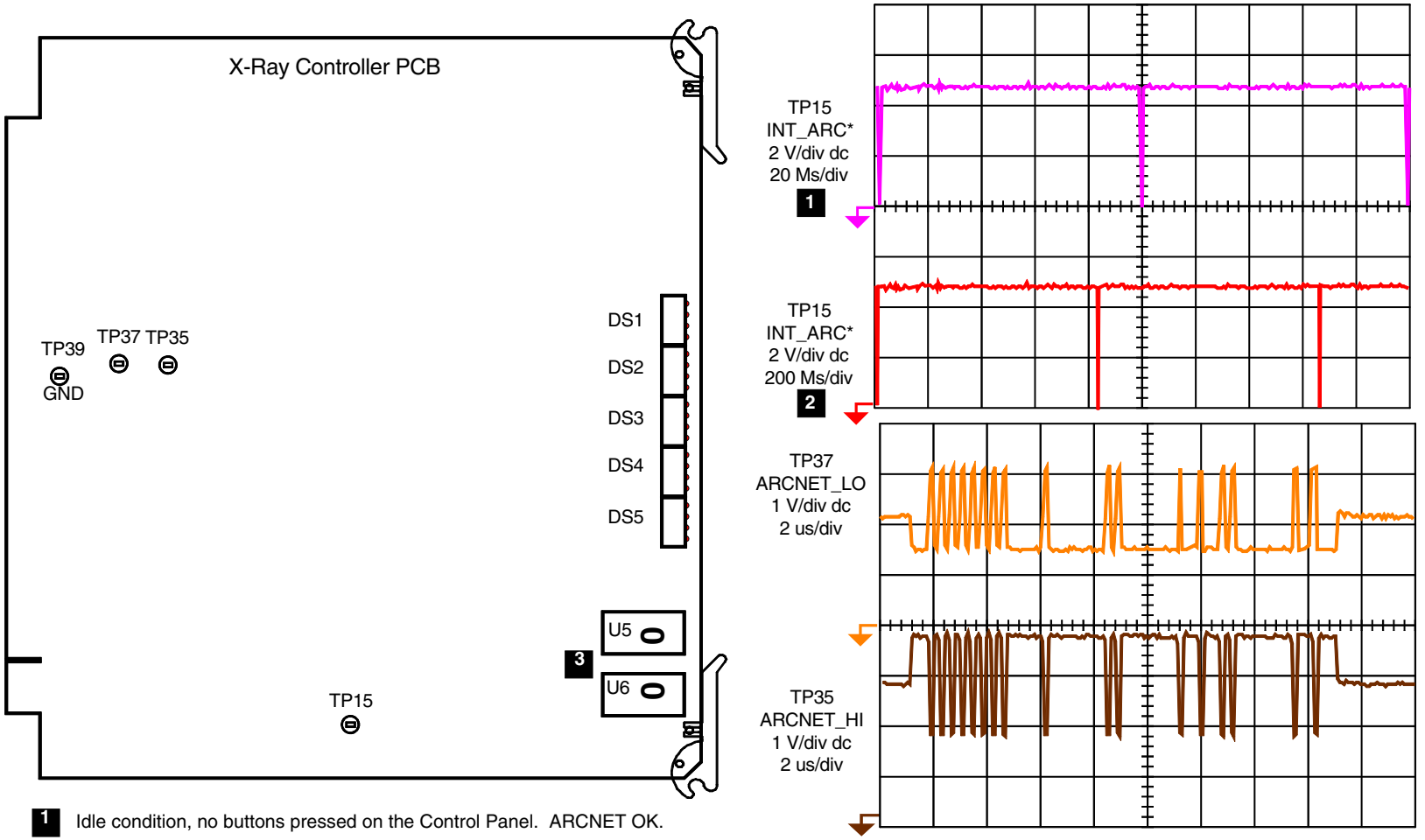
2 Idle condition, no buttons pressed on Control Panel.

3 Segment 6 on DS1 blinks at 1Hz rate when Fluoro Functions Micro Controller is running.

4 The code displayed on U1-U2 is **OE** when ARCNET communication is lost.

	9800
	GE OEC Training | Page 3 of 4
	ARC_NET.DSF | 11/00
Arcnet Communications Fluoro Functions Waveforms	

Functional Block 26 – ARCNET Communications Fluoro Functions Waveforms (3 of 4)



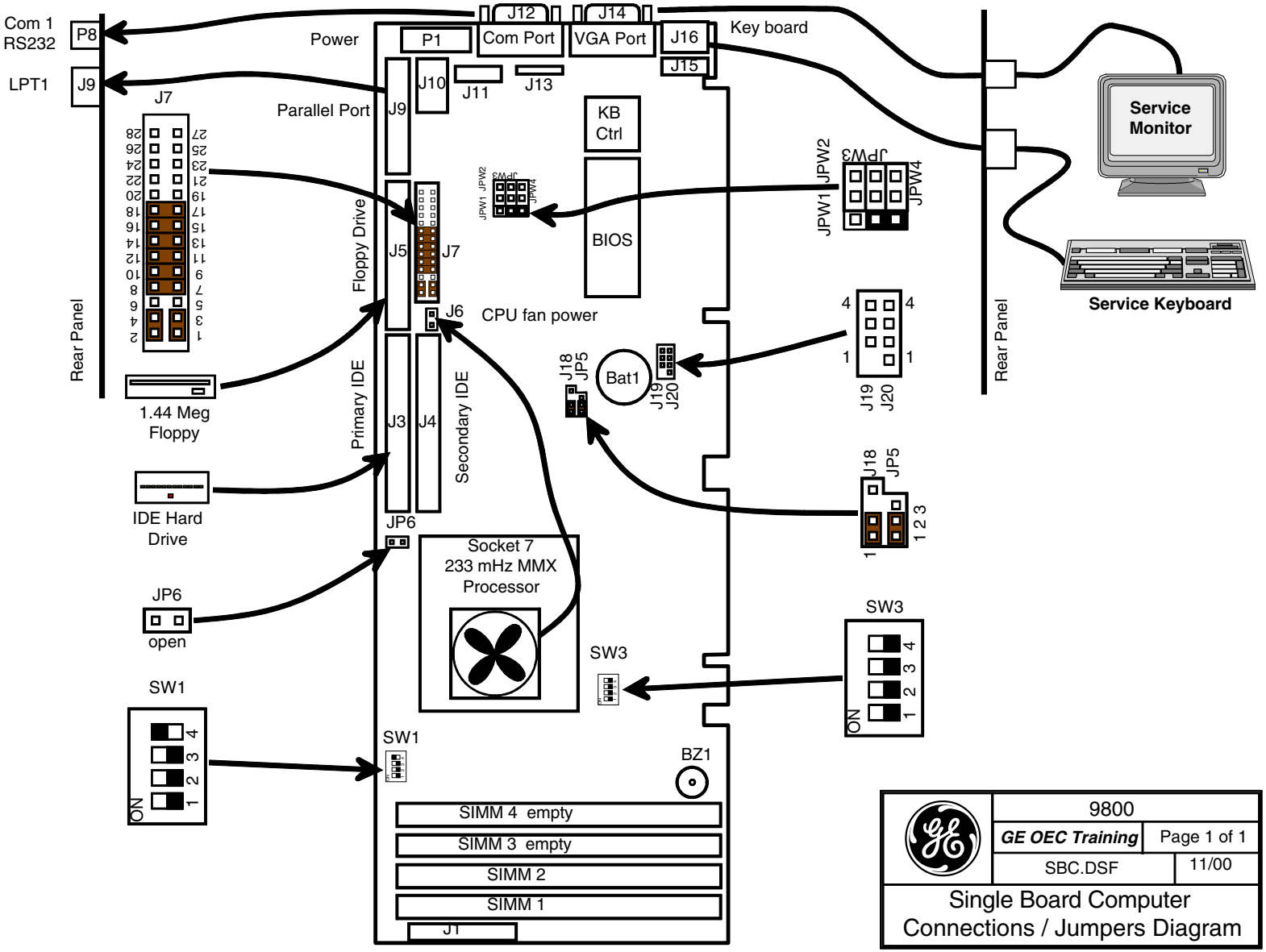
1 Idle condition, no buttons pressed on the Control Panel. ARCNET OK.

2 ARCNET failed condition.

3 The code displayed on U5-U6 is **00** representing normal operation.

	9800
	GE OEC Training | Page 4 of 4
	ARC_NET.DSF | 11/00
Arcnet Communications X-Ray Controller Waveforms	

Functional Block 27 – ARCNET Communications X-ray Controller Waveforms (4 of 4)



Functional Block 28 – Single Board Computer Connections / Jumpers (1 of 1)

Workstation Control Panel Processor Reset & Bootup Page 2 of 15	Workstation Control Panel Processor Reset Waveform Page 3 of 15	Workstation Control Panel Key Board Interface Page 4 of 15
Workstation Control Panel IR Remote / Receiver Interface Page 5 of 15	Workstation Control Panel Communication to System Interface Page 6 of 15	Workstation Control Panel Communication Waveforms Page 7 of 15
Workstation System Interface Monitor Serial Communications Page 8 of 15	Workstation System Interface Monitor Serial Waveforms Page 9 of 15	Workstation Touch Screen to System Interface Communications Page 10 of 15
Workstation Touch Screen to System Interface Waveforms Page 11 of 15	Workstation Remote Diagnostics Interface Page 12 of 15	Workstation System Interface Communications Overview 1 Page 13 of 15
Workstation System Interface Communications Overview 2 Page 14 of 15	Workstation Modem to System Interface Communications Page 15 of 15	

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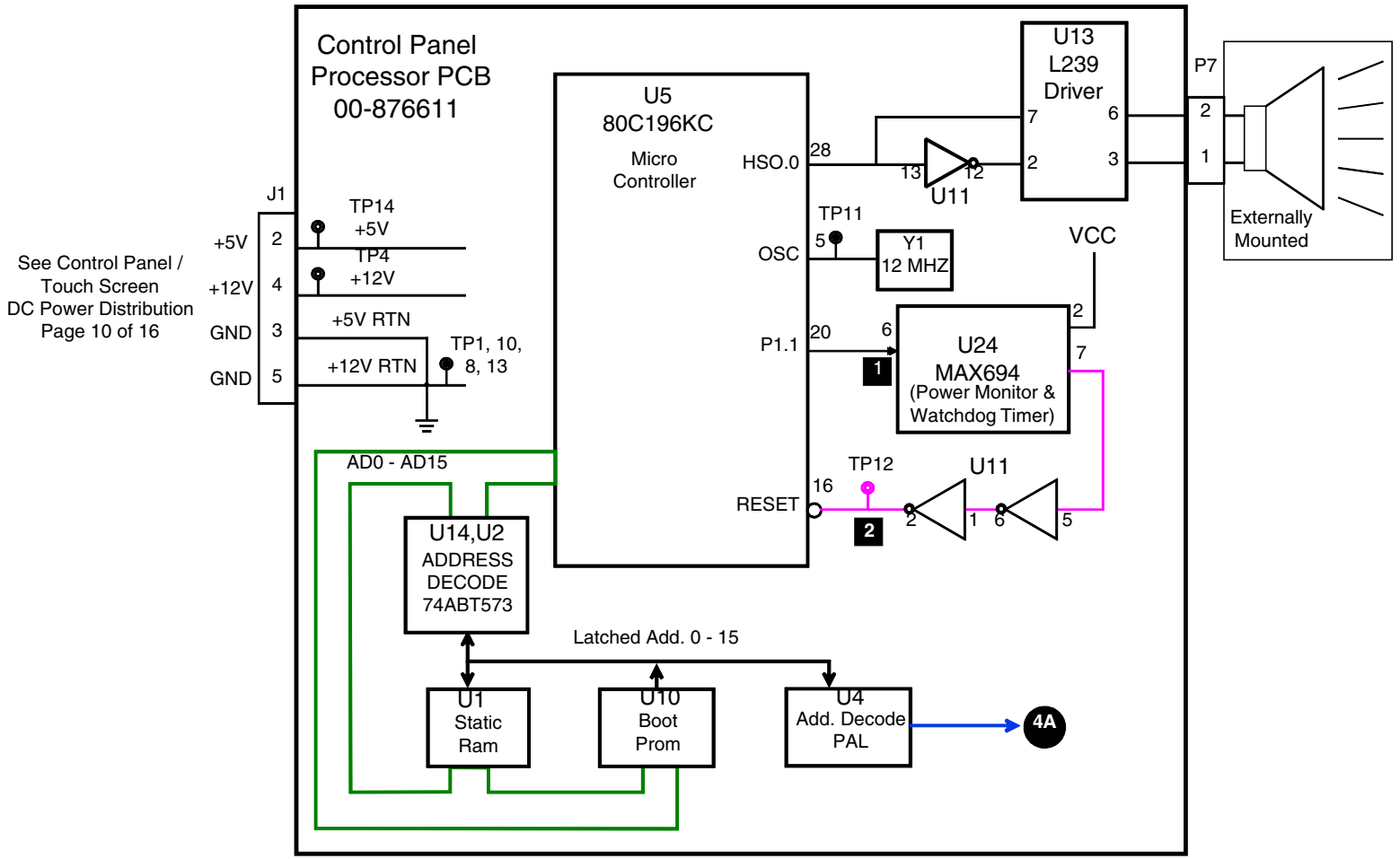
	WSSCOM.DSF 11/00
Workstation Communications Functional Diagram Map	

Functional Block 29 – Workstation Communications (1 of 15)



1 Resets Watchdog timer every 3 ms.

2 TP12 is High under nornal conditions.
TP12 will go Low causing U5 to be reset if VCC drops below 4.65 volts, or if the watchdog timer reset pulses are lost.

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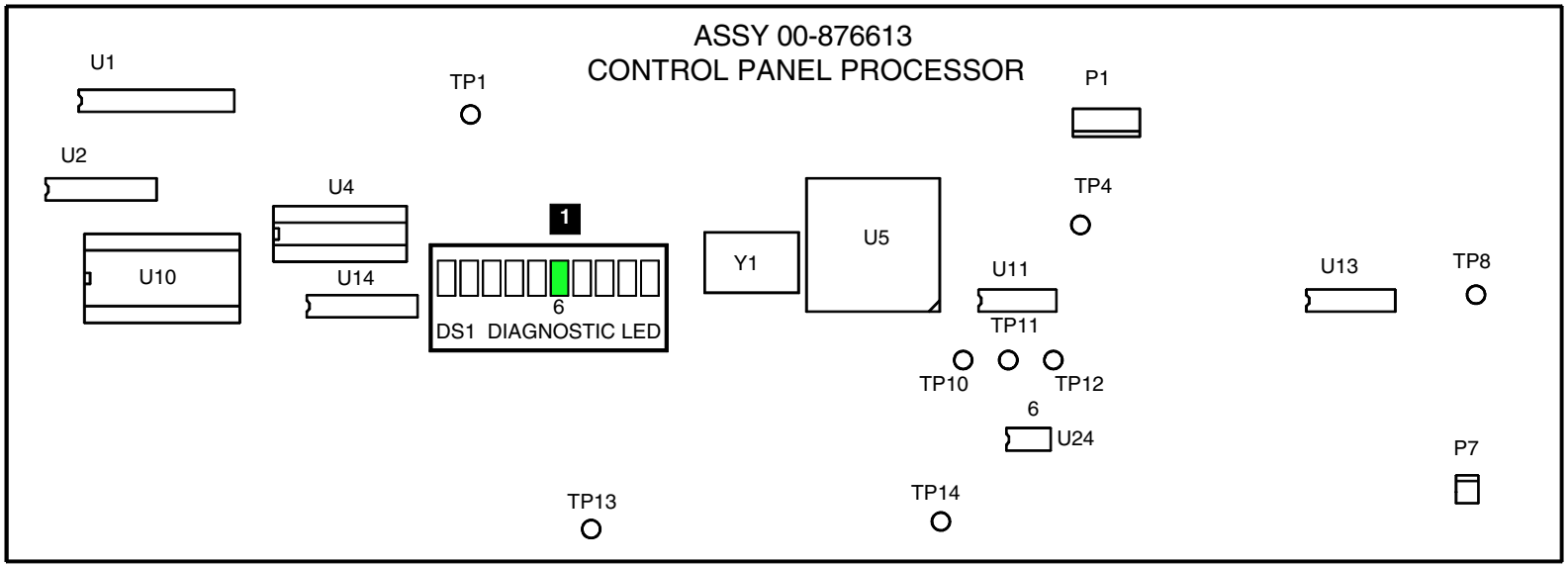
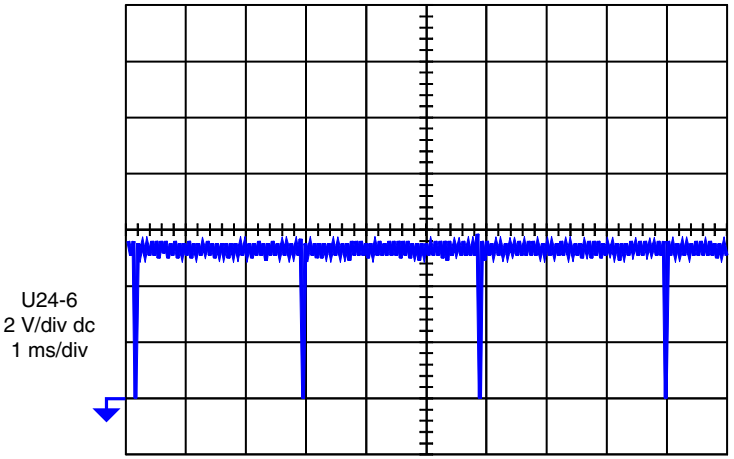
WSSCOM.DSF	11/00
Workstation Control Panel Processor Reset & Bootup	

Functional Block 30 – Workstation Control Panel Processor Reset and Boot-up (2 of 15)





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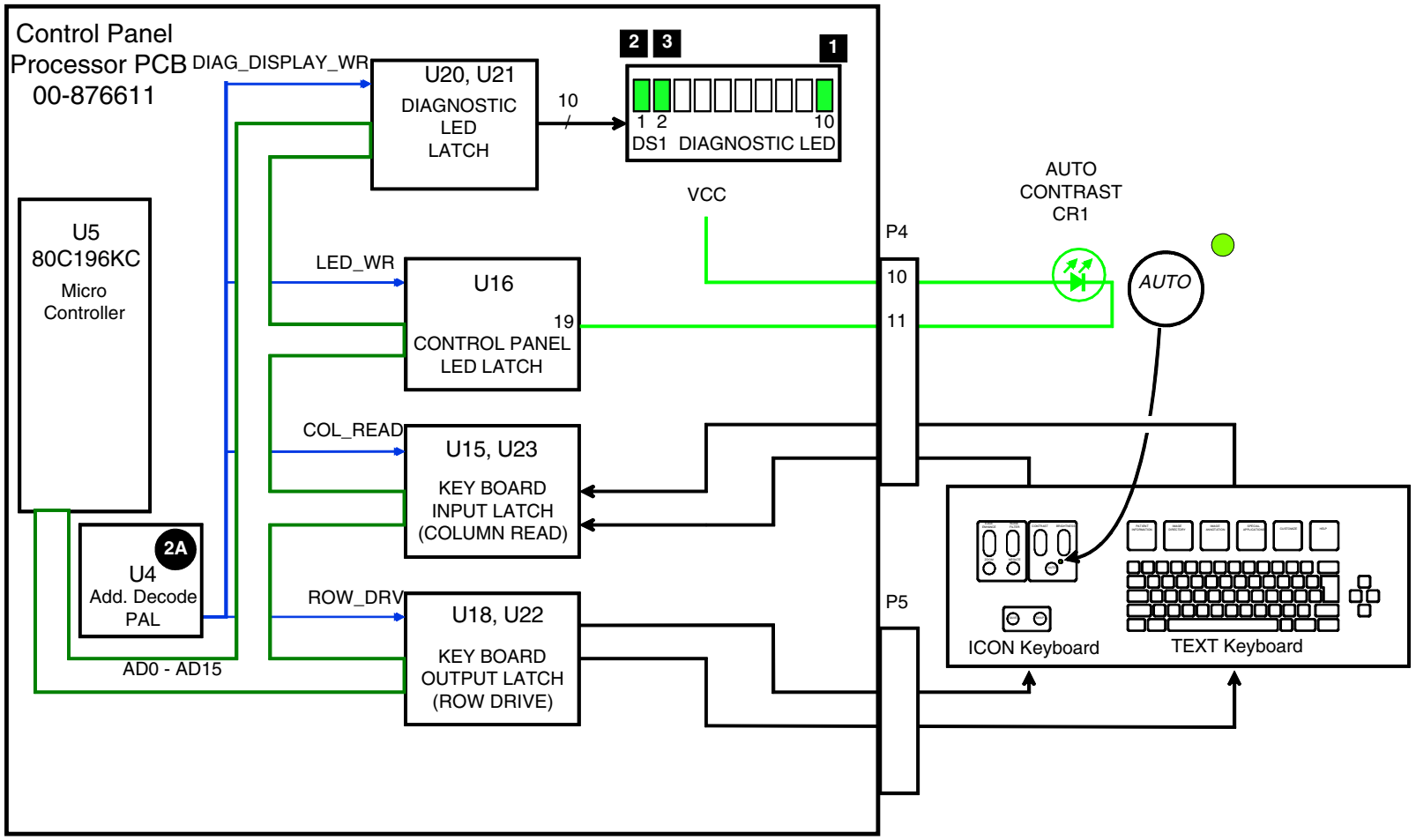
Workstation Control Panel
Processor Reset Waveform

1 Segment 6 indicates the alarm is being driven.

Functional Block 31 – Workstation Control Panel Processor Reset Waveform (3 of 15)



1 Segment 10 blinks ON & OFF indicating that the Micro Controller(U5) is running.

2 Segment 1 lights when buttons on the ICON keyboard are pressed.

3 Segment 2 lights when buttons on the TEXT keyboard are pressed.

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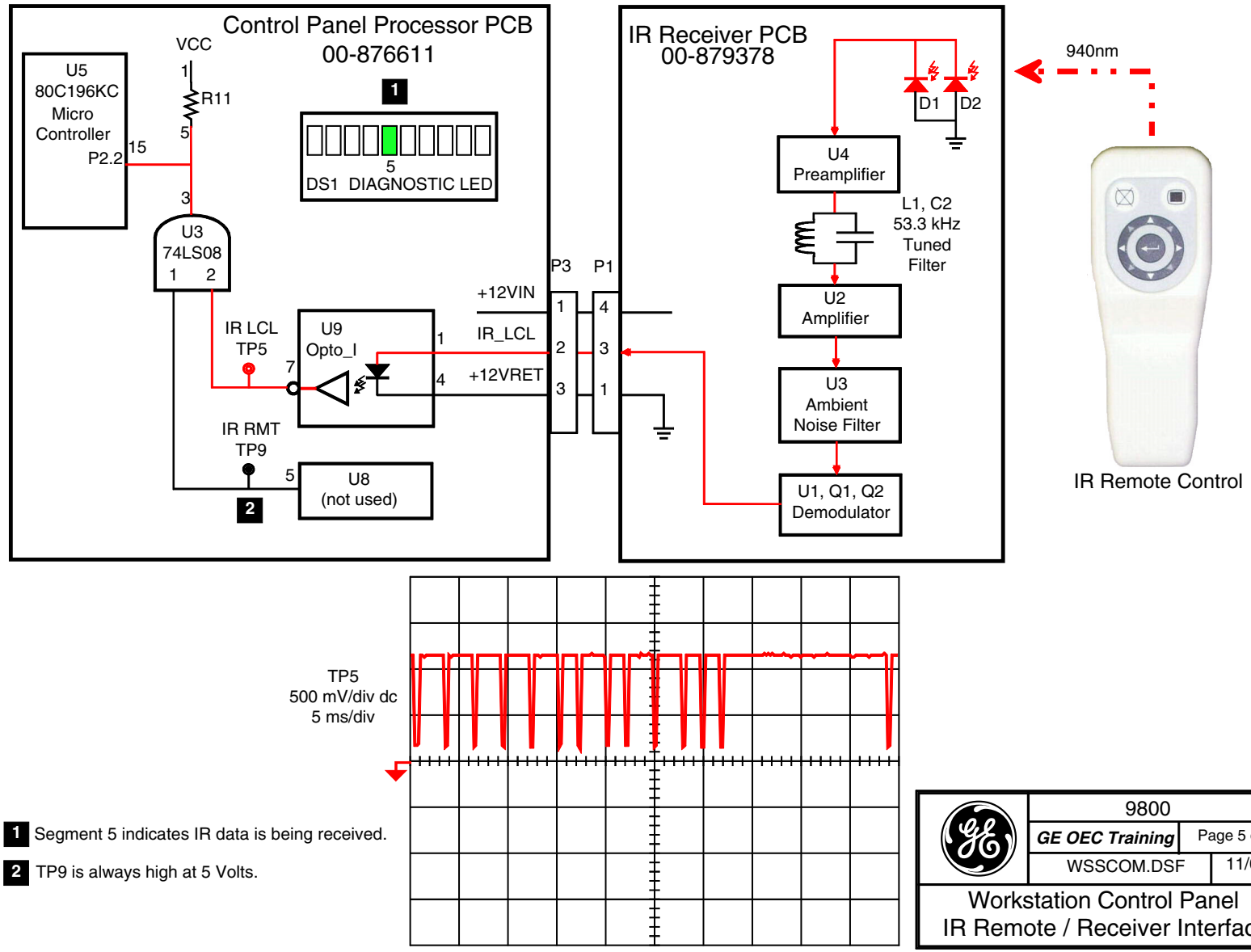
Workstation Control Panel Key Board Interface	

Functional Block 32 – Workstation Control Panel Key Board Interface (4 of 15)



1 Segment 5 indicates IR data is being received.

2 TP9 is always high at 5 Volts.

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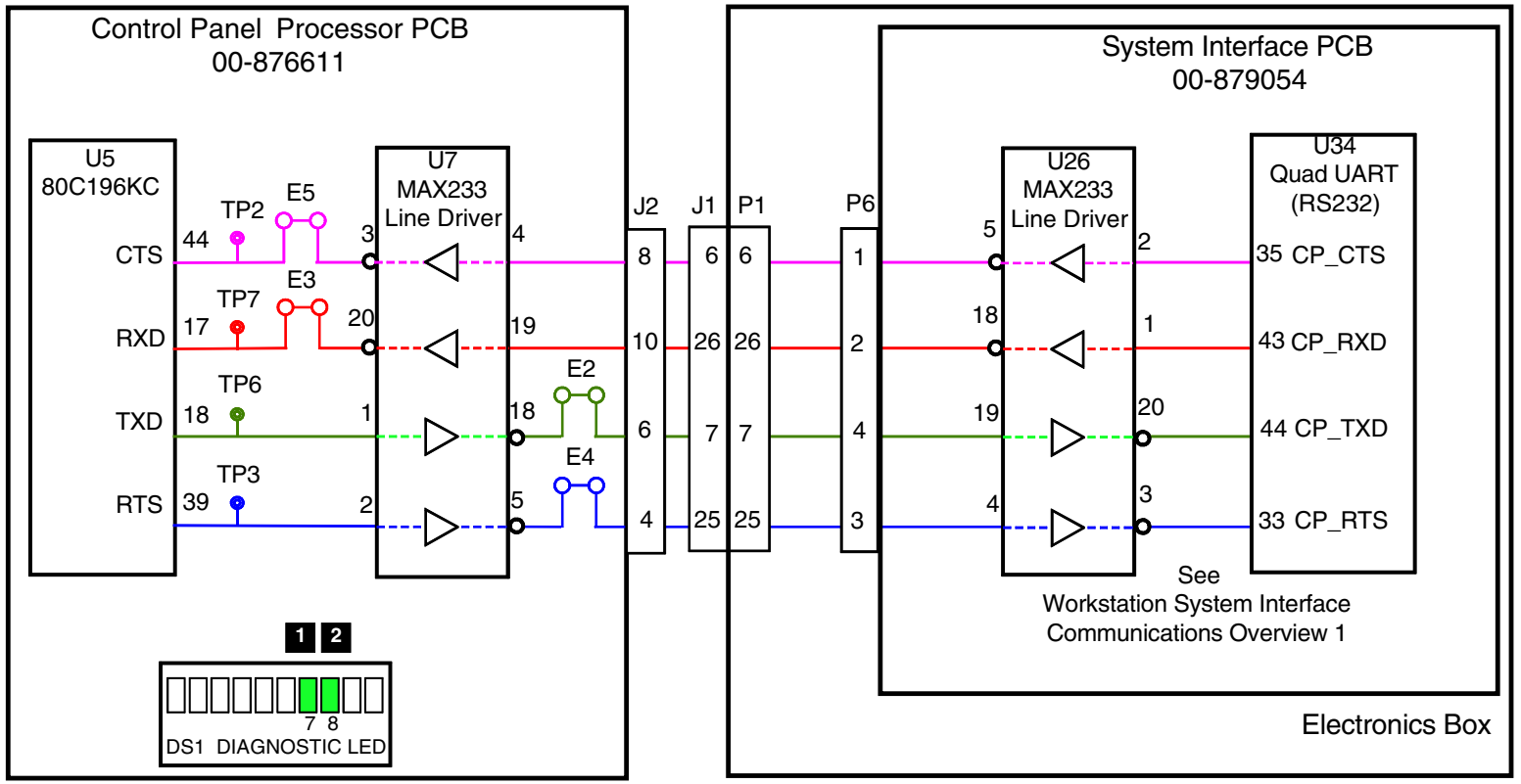
	WSSCOM.DSF — 11/00
Workstation Control Panel IR Remote / Receiver Interface	

Functional Block 33 – Workstation Control Panel IR Remote / Receiver Interface (5 of 15)



1 Segment 7 indicates Serial Data is being received from the System Interface PCB.

2 Segment 8 indicates Serial Data is being sent to the System Interface PCB.

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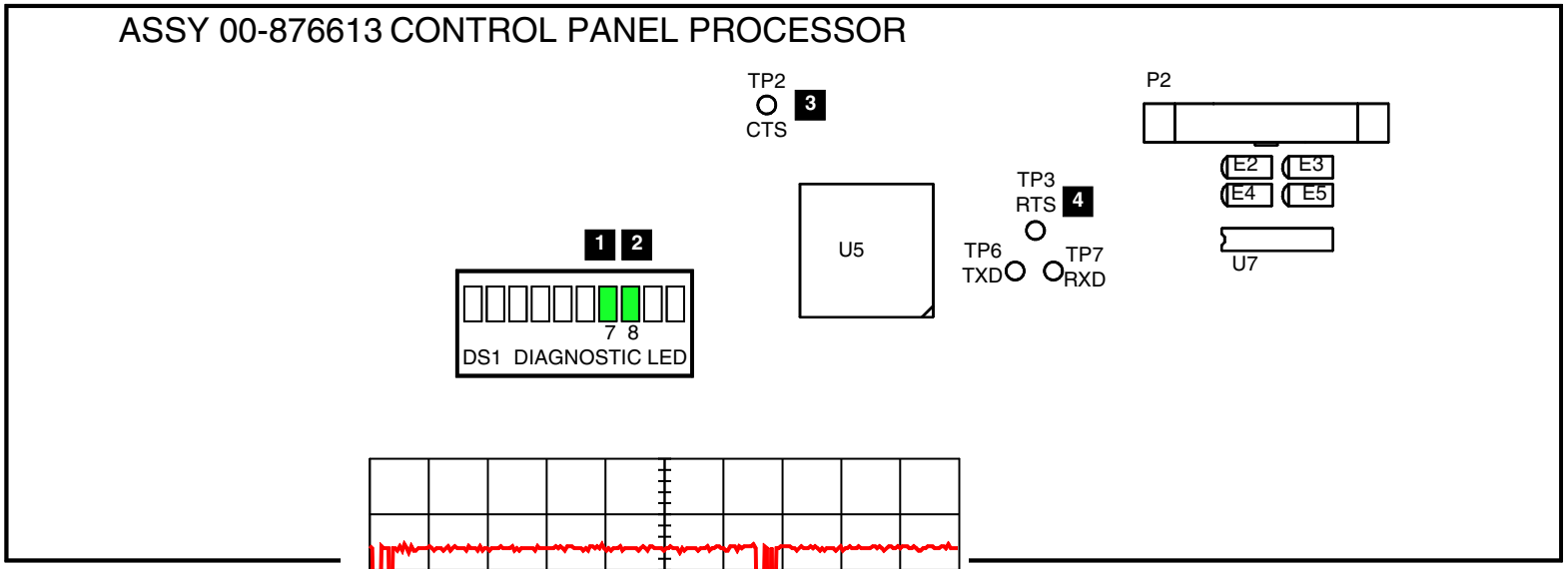
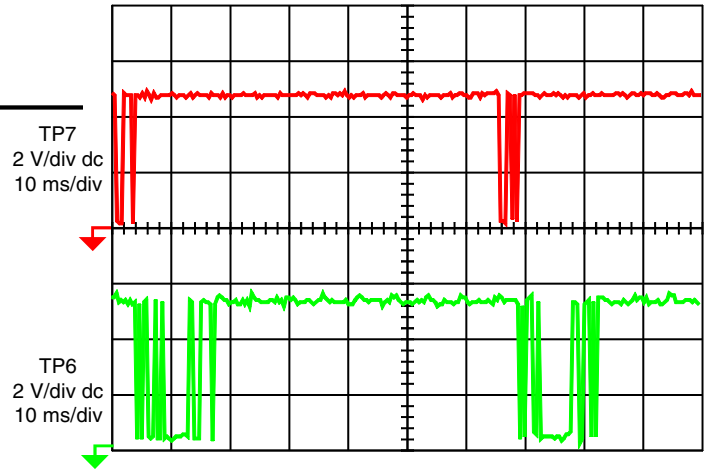
Workstation Control Panel Communication to System Interface	

Functional Block 34 – Workstation Control Panel Communication to System Interface (6 of 15)





1 Segment 7 indicates Serial Data is being received from the System Interface PCB.

2 Segment 8 indicates Serial Data is being sent to the System Interface PCB.

3 TP2 CTS stays at 0 Volts after bootup.

4 TP3 RTS stays at 0 Volts after bootup.

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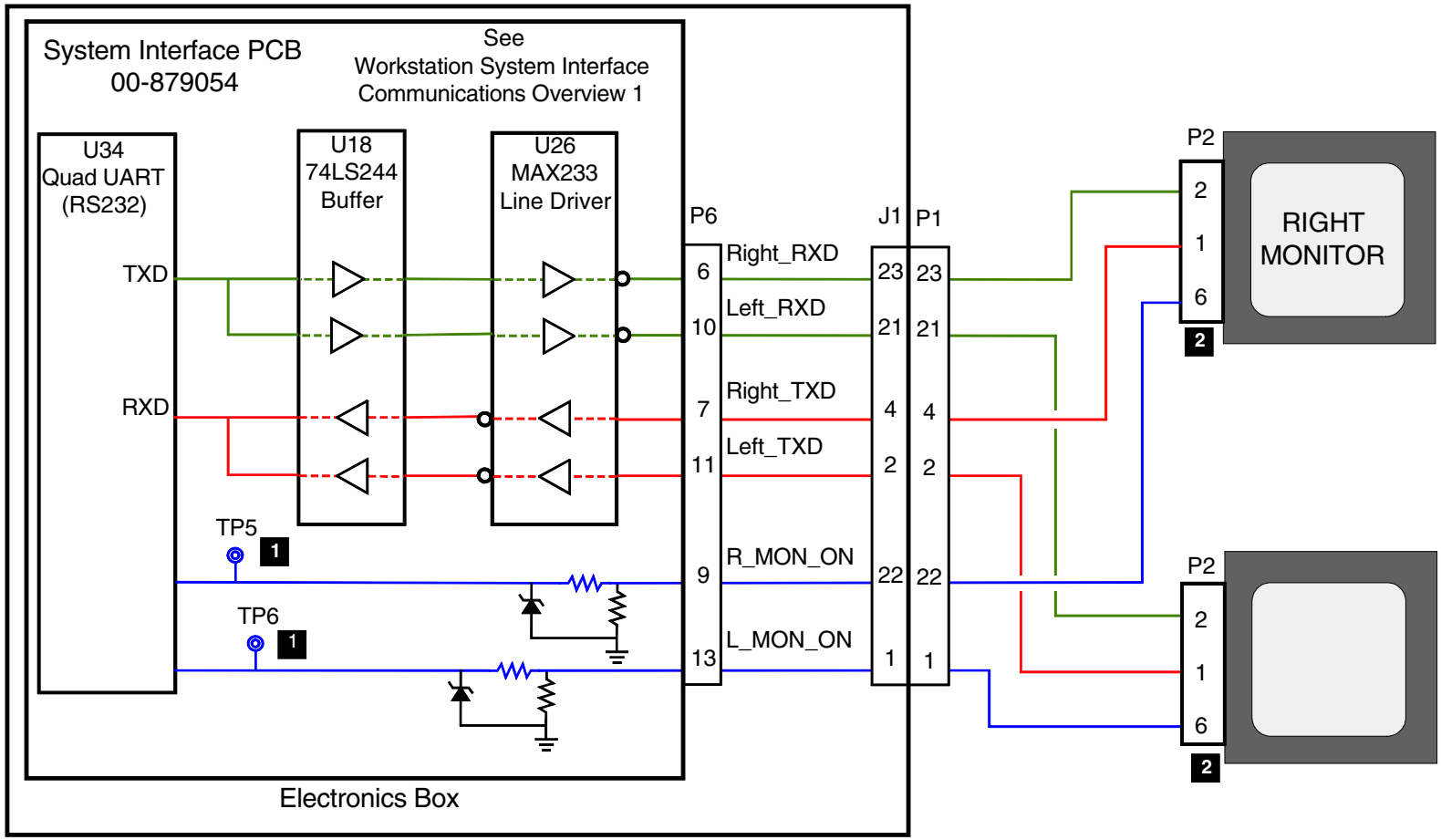
Workstation Control Panel Communication Waveforms		

Functional Block 35 – Workstation Control Panel Communication Waveforms (7 of 15)



1 TP5, TP6
Monitor ON = +5 Volts
Monitor failed = 0 Volts

2 P2-6
Monitor ON = +11 Volts
Monitor failed = 0 Volts

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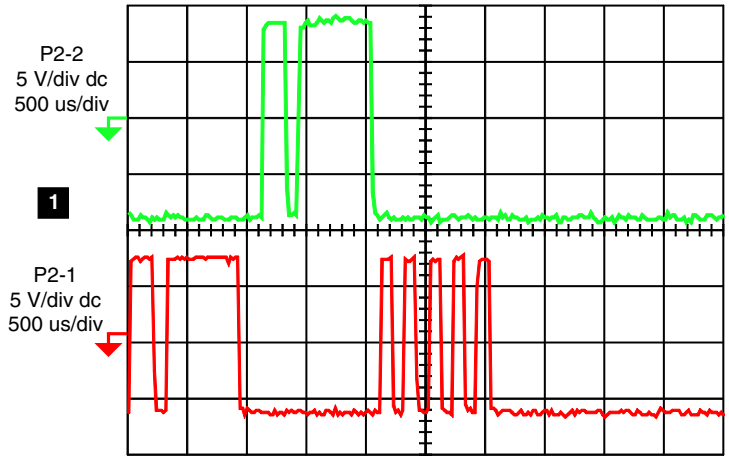
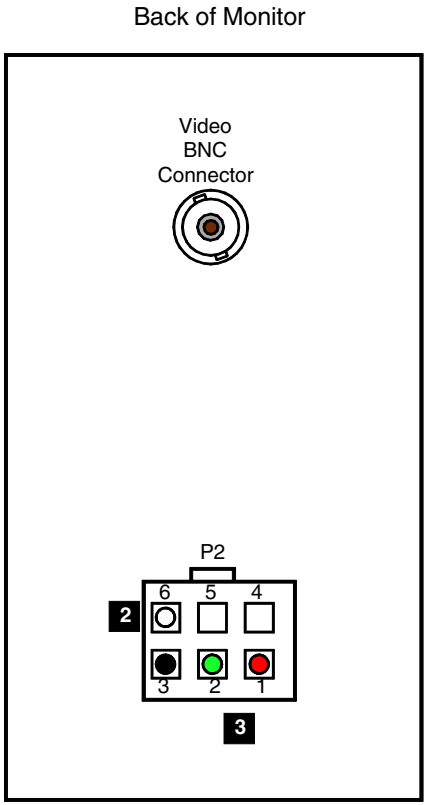
Workstation System Interface Monitor Serial Communications		

Functional Block 36 – Workstation System Interface Monitor Serial Communications (8 of 15)





1 Serial communications are present only while adjusting monitor sizing or brightness and contrast adjustments using the RUT utility.

2 P2-6 is +11 volts while monitor is in the ON condition.

3 P2 pins 1 & 2 are at -8 volts in normal operation.

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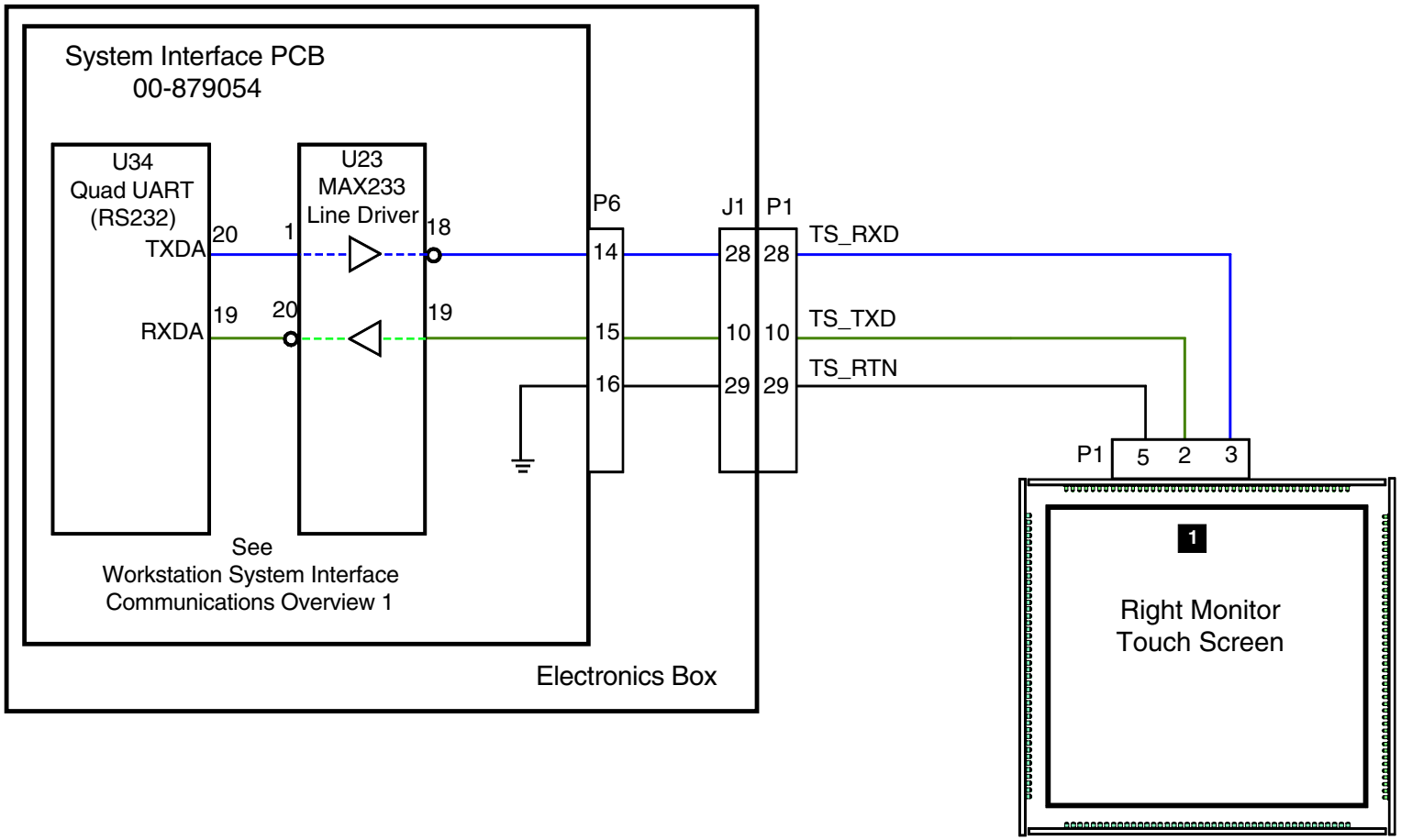
Workstation System Interface Monitor Serial Waveforms		

Functional Block 37 – Workstation System Interface Monitor Serial Waveforms (9 of 15)



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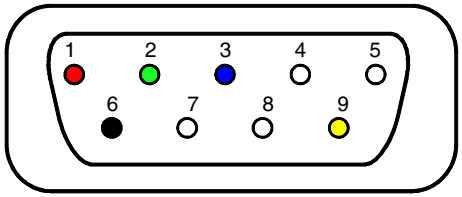
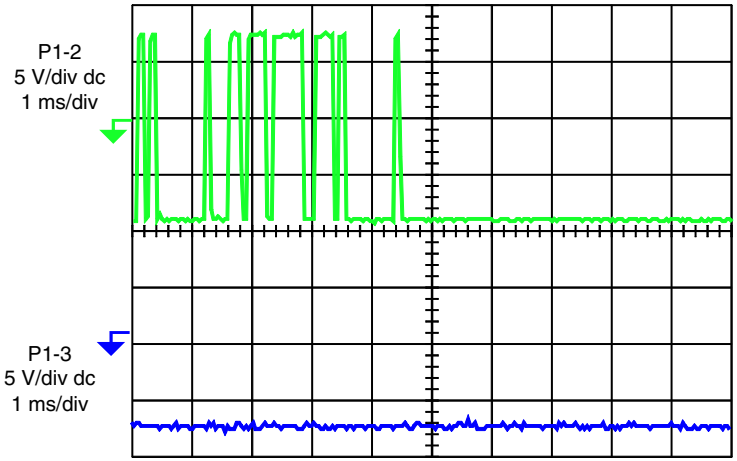
Workstation Touch Screen to System Interface Communications	

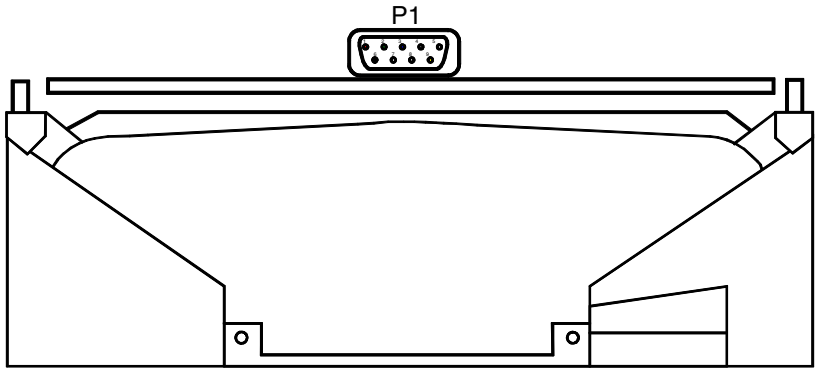
1 Internal operation of the Touch Screen is propriety and not supplied by the vendor.

Functional Block 38 – Workstation Touch Screen to System Interface Communication (10 of 15)

1 Red +15Volts
2 Green TS_TXD
3 Blue TS_RXD
5 White TS_RTN
6 Black Ground
9 Yellow +12 Volts







Monitor
Rear View

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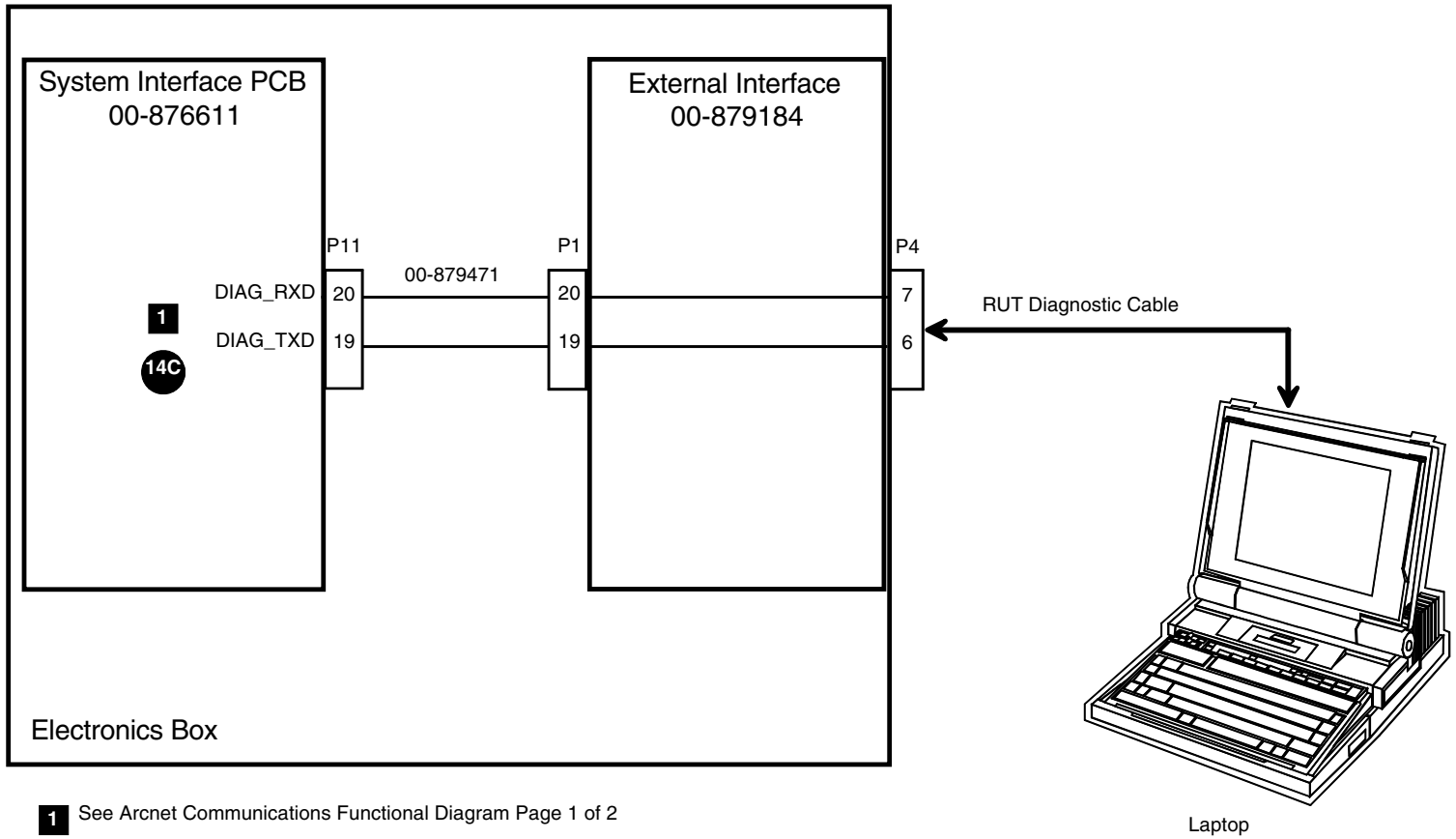
Workstation Touch Screen to System Interface Waveforms	

Functional Block 39 – Workstation Touch Screen to System Interface Waveforms (11 of 15)



1 See Arcnet Communications Functional Diagram Page 1 of 2

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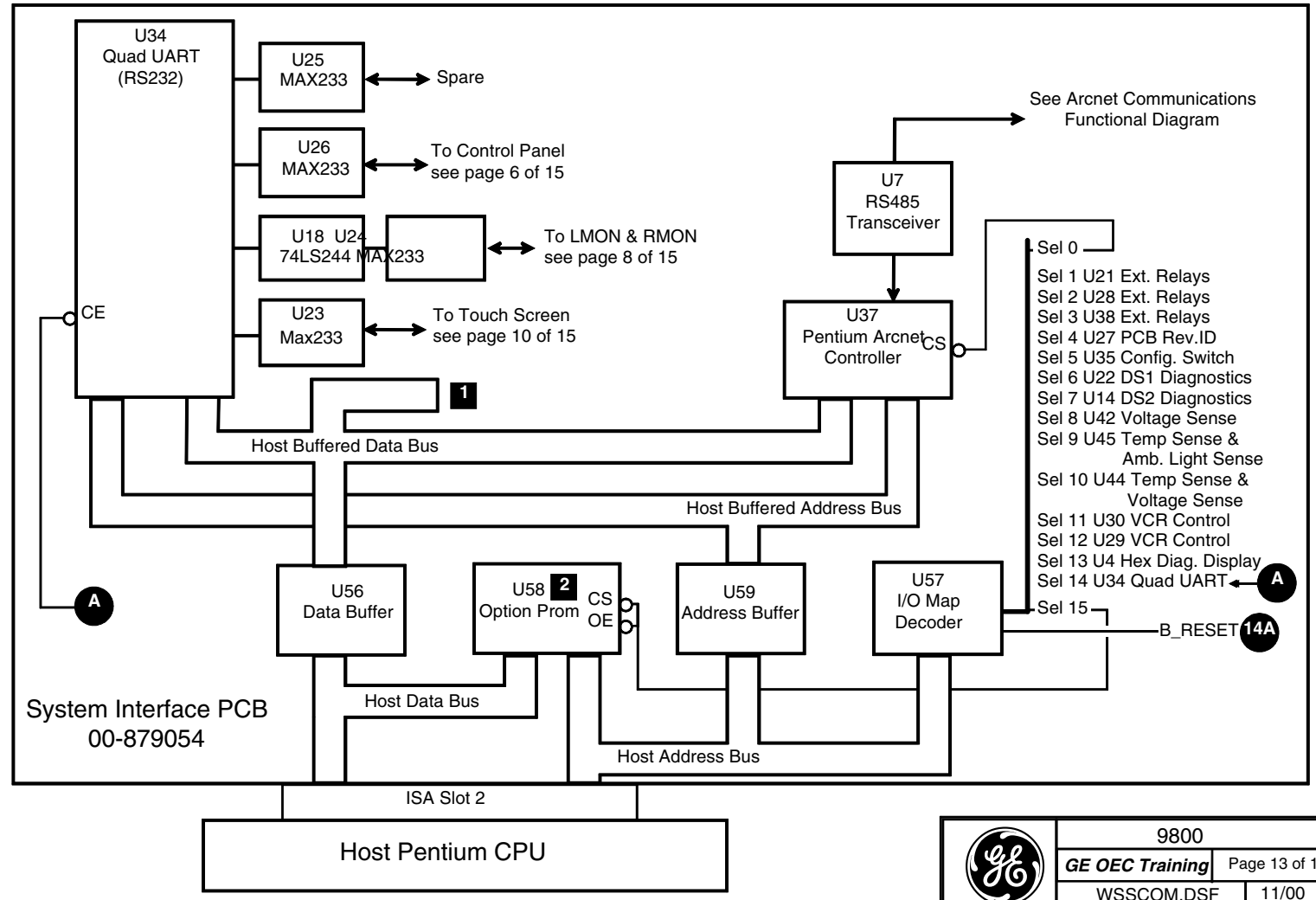
Workstation Remote Diagnostics Interface		

Functional Block 40 – Workstation Remote Diagnostic Interface (12 of 15)



1 See System Interface I/OMap Select Lines Diagram
Pages 2 of 10, 4 of 10, 6 of 10, 7 of 10, 8 of 10, 9 of 10

2 Option Prom U58 prevents access to DOS with a non OEC boot disk.

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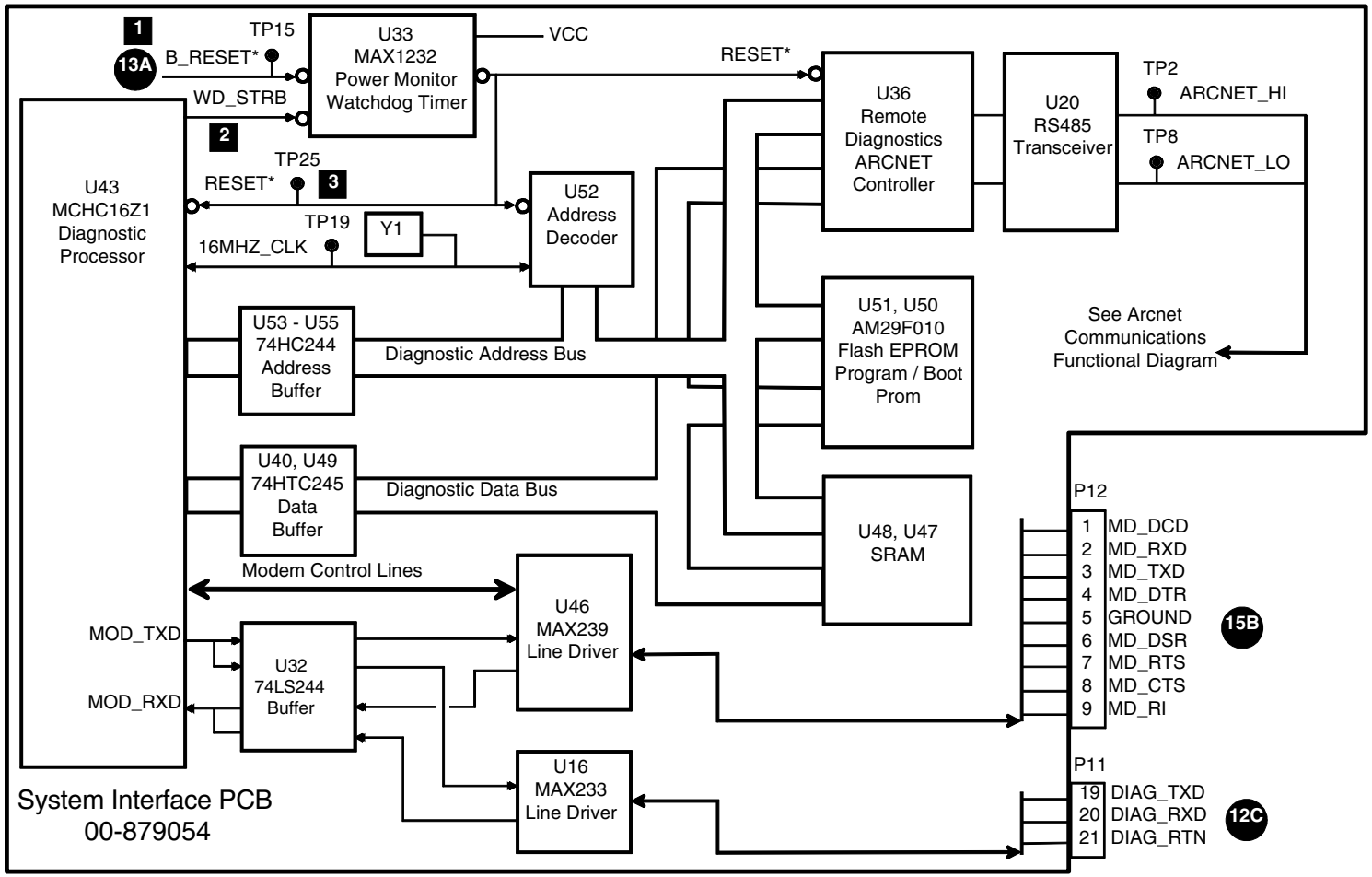
Workstation System Interface Communications Overview 1	

Functional Block 41 – Workstation System Interface Communications Overview 1 (13 of 15)



1 B_RESET is controlled by the Host Pentium Processor.

2 WD_STRB resets the Watchdog timer as the Diagnostic Processor runs.

3 RESET* at TP25 is normally High. Diagnostic Processor U43 will be reset if VCC drops below 4.65 Volts, WD_STRB signal is lost, or if the Host Pentium Processor issues a reset via B_RESET at TP15.

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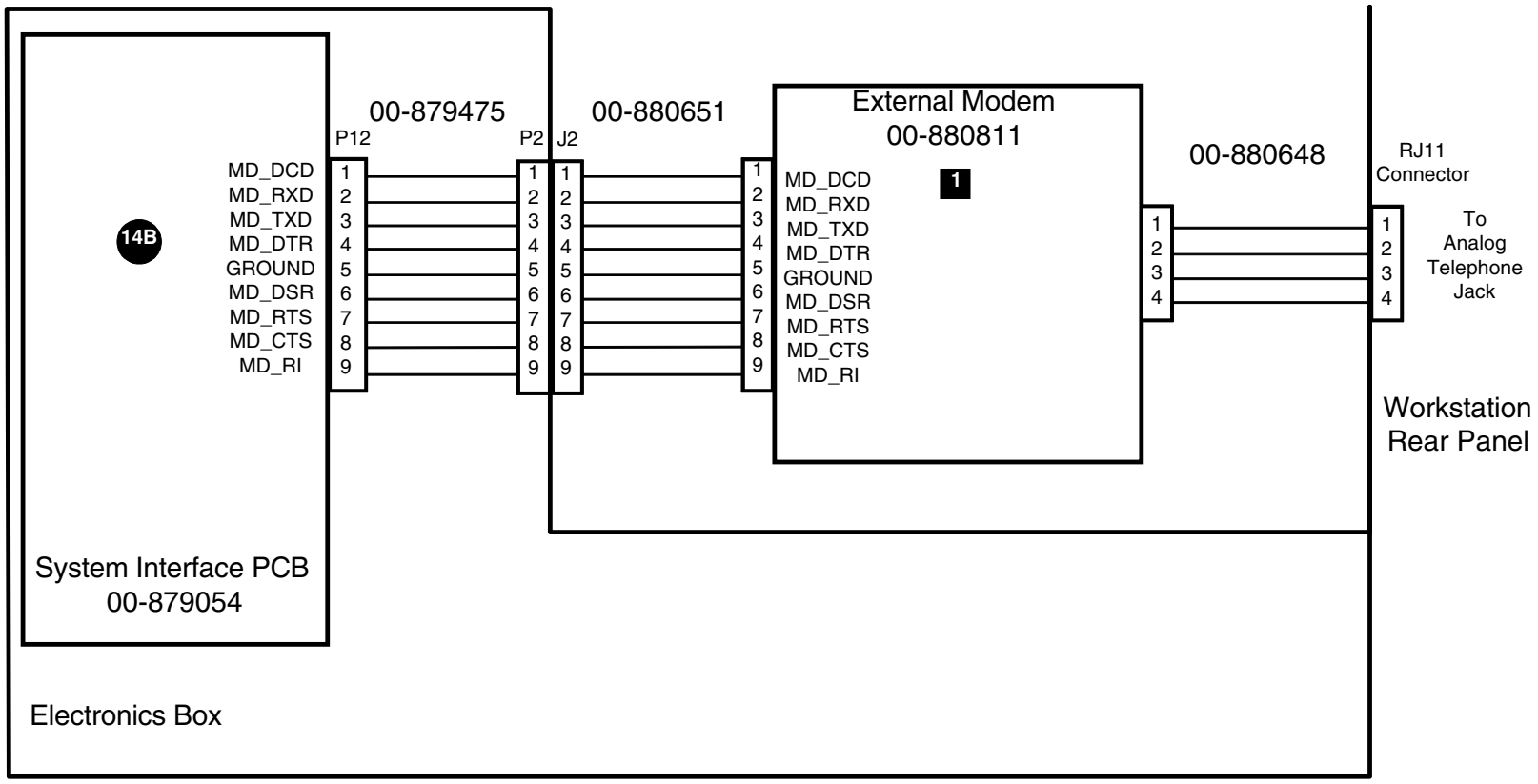
Workstation System Interface Communications Overview 2		

Functional Block 42 – Workstation System Interface Communications Overview 2 (14 of 15)



1 Not currently installed.

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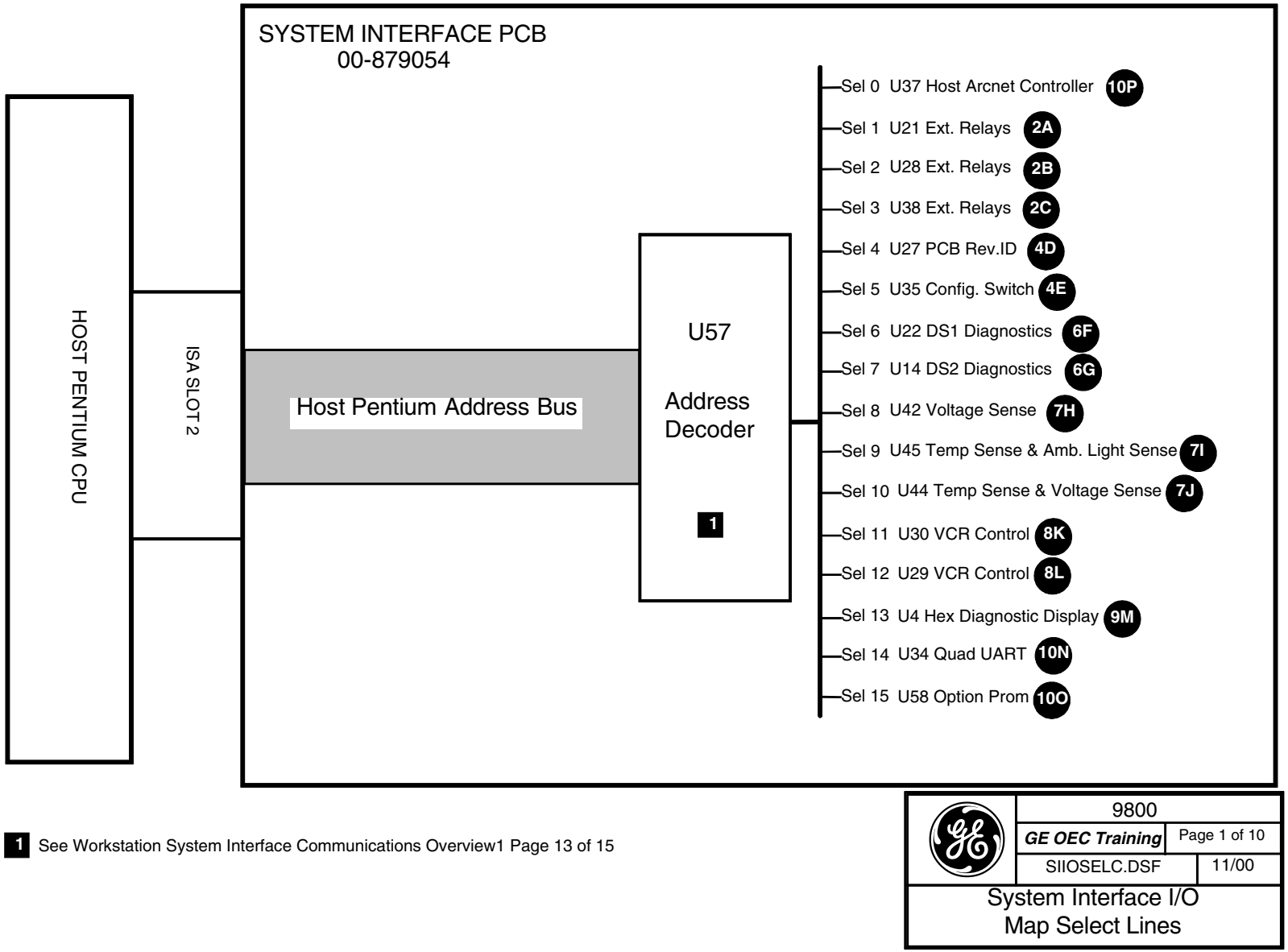
Workstation Modem to System Interface Communications	

Functional Block 43 – Workstation Modem to System Interface Communications (15 of 15)


SYSTEM INTERFACE PCB
00-879054
HOST PENTIUM CPU
ISA SLOT 2
Host Pentium Address Bus
U57
Address
Decoder
1
Sel 0 U37 Host Arcnet Controller 10P
Sel 1 U21 Ext. Relays 2A
Sel 2 U28 Ext. Relays 2B
Sel 3 U38 Ext. Relays 2C
Sel 4 U27 PCB Rev.ID 4D
Sel 5 U35 Config. Switch 4E
Sel 6 U22 DS1 Diagnostics 6F
Sel 7 U14 DS2 Diagnostics 6G
Sel 8 U42 Voltage Sense 7H
Sel 9 U45 Temp Sense & Amb. Light Sense 7I
Sel 10 U44 Temp Sense & Voltage Sense 7J
Sel 11 U30 VCR Control 8K
Sel 12 U29 VCR Control 8L
Sel 13 U4 Hex Diagnostic Display 9M
Sel 14 U34 Quad UART 10N
Sel 15 U58 Option Prom 10O

1 See Workstation System Interface Communications Overview1 Page 13 of 15

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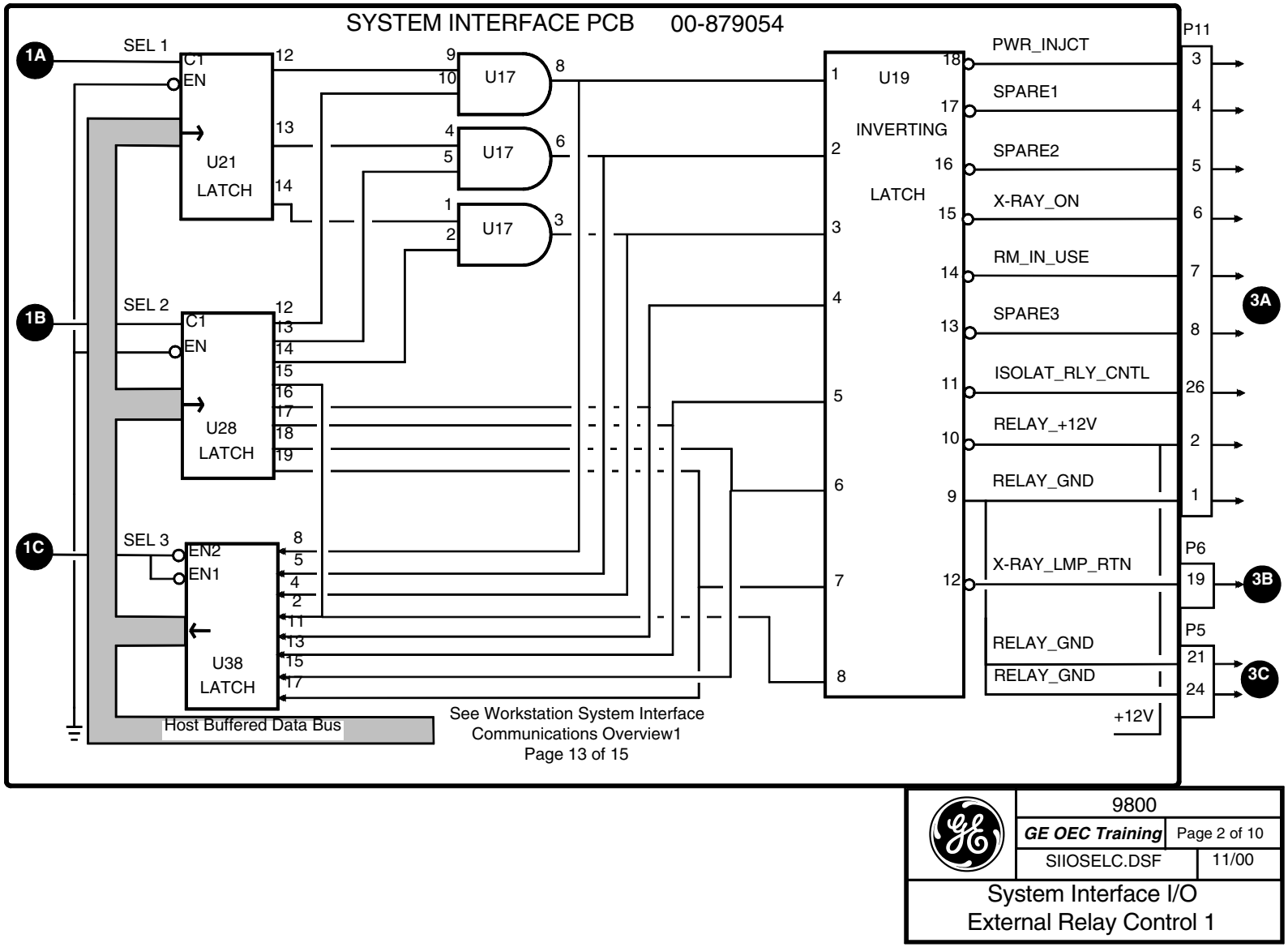
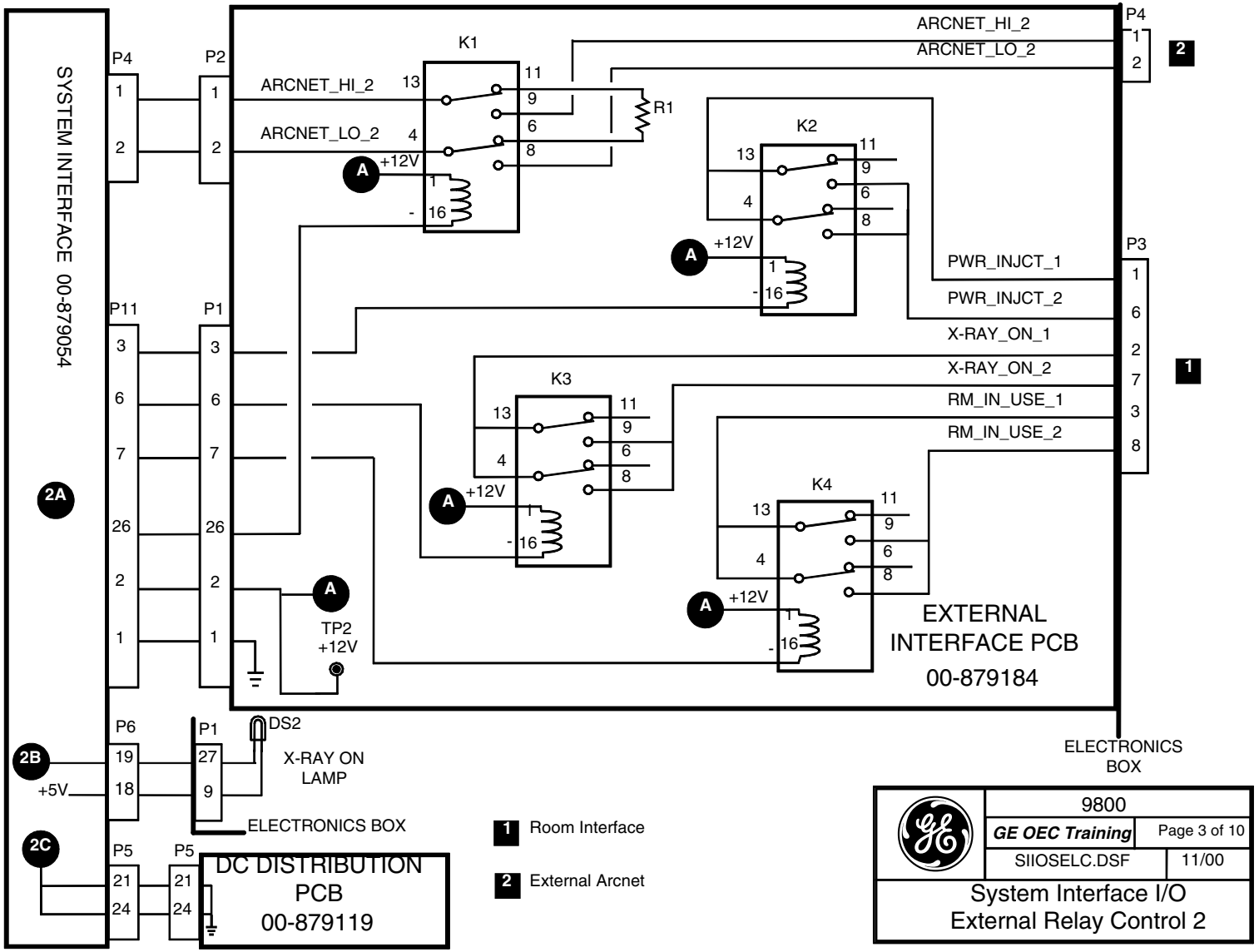
System Interface I/O Map Select Lines		

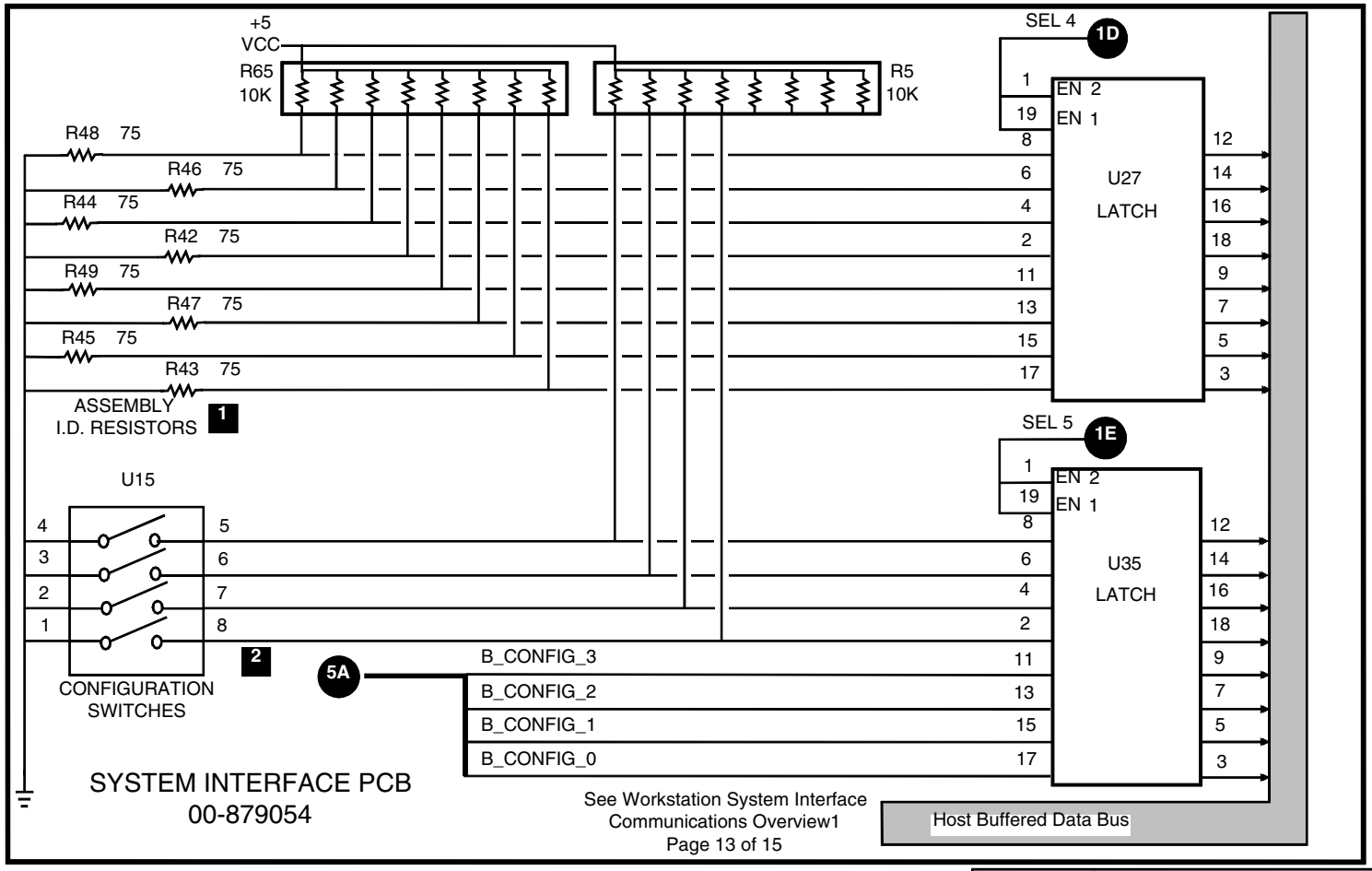
Functional Block 44 – System Interface I/O Map Select Lines (1 of 10)



Functional Block 45 – System Interface I/O External Relay Control 1 (2 of 10)



Functional Block 46 – System Interface I/O External Relay Control 2 (3 of 10)



1 Installed resistors indicate PCB revision level.

2 All switches must be set to the OFF or OPEN position.

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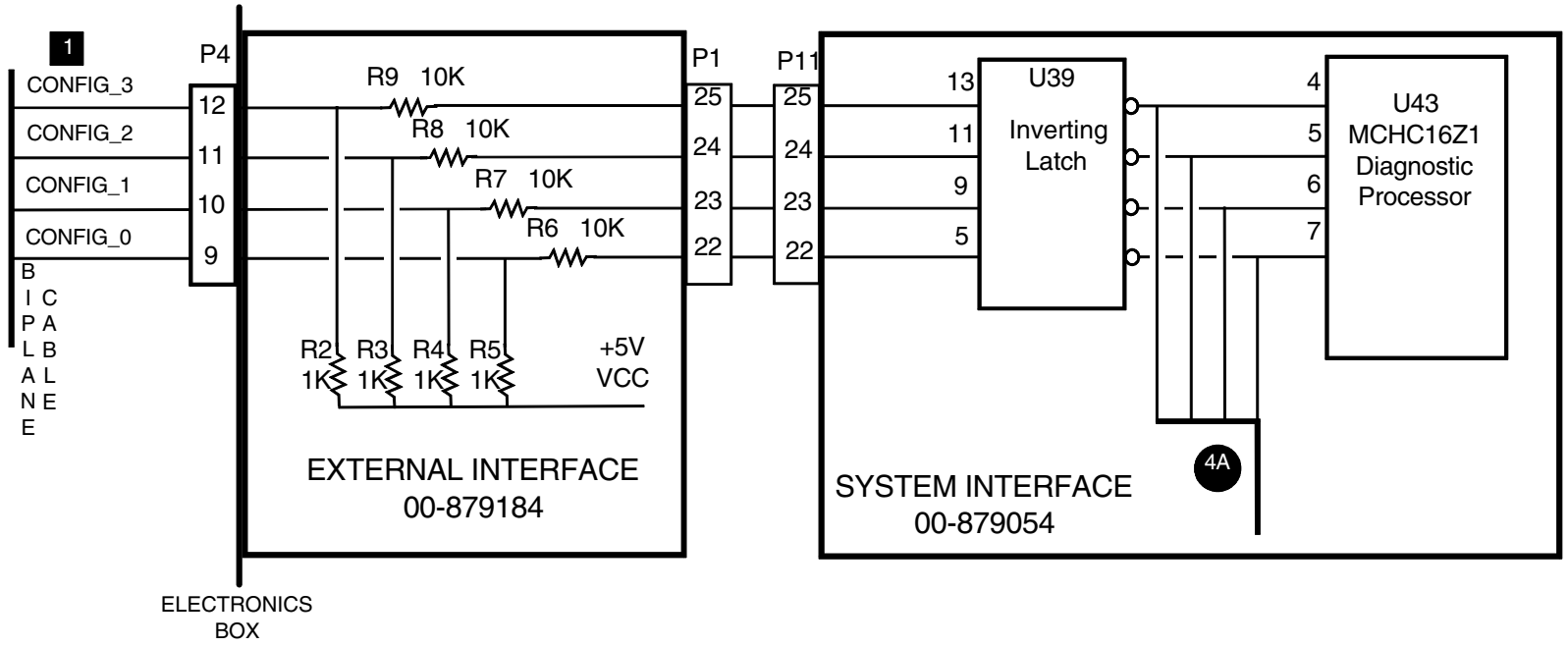
	SIIOSELC.DSF	11/00
System Interface I/O Config Switch & ID		

Functional Block 47 – System Interface I/O Configuration Switch and ID (4 of 10)



1 External Arcnet

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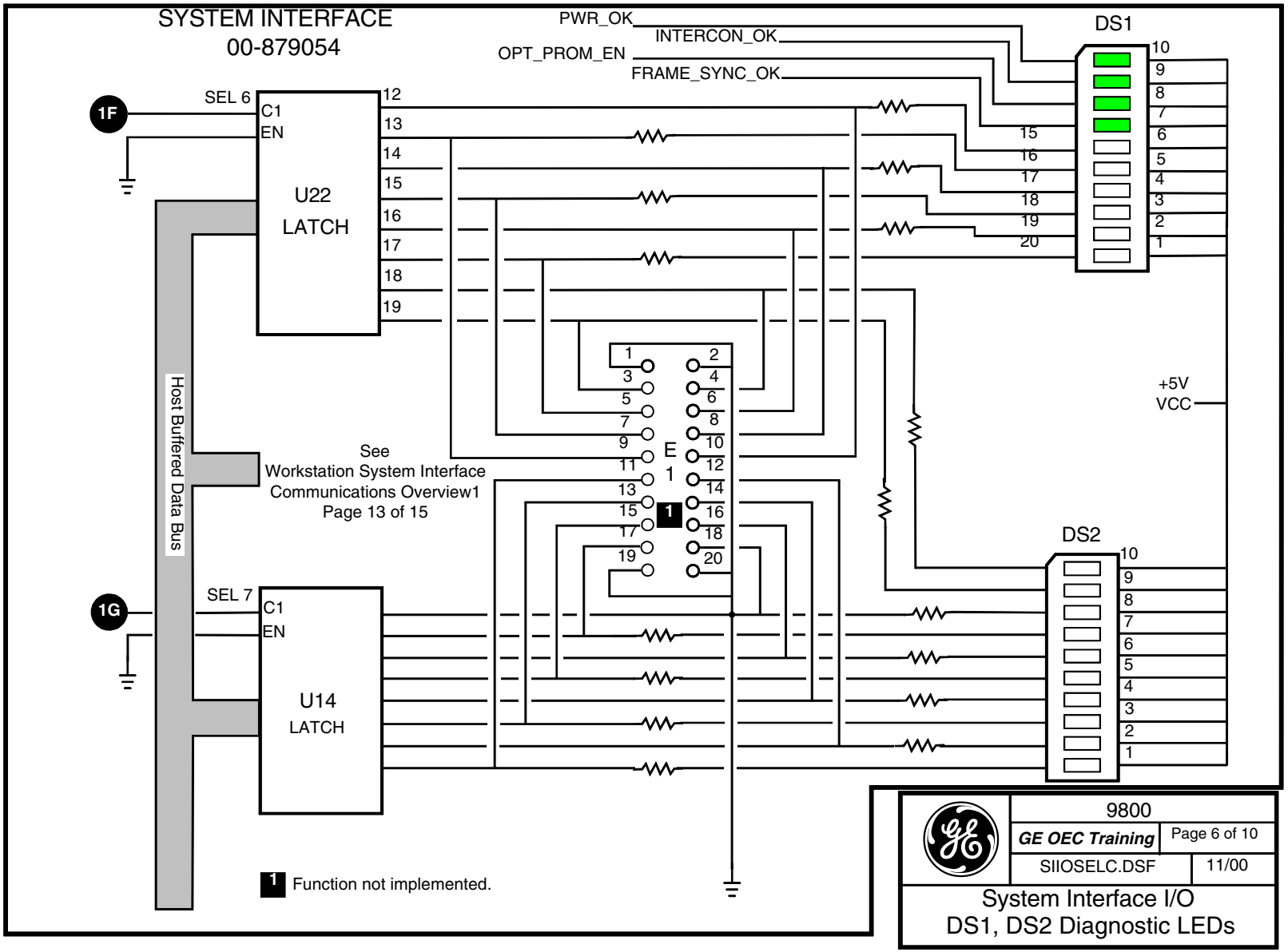
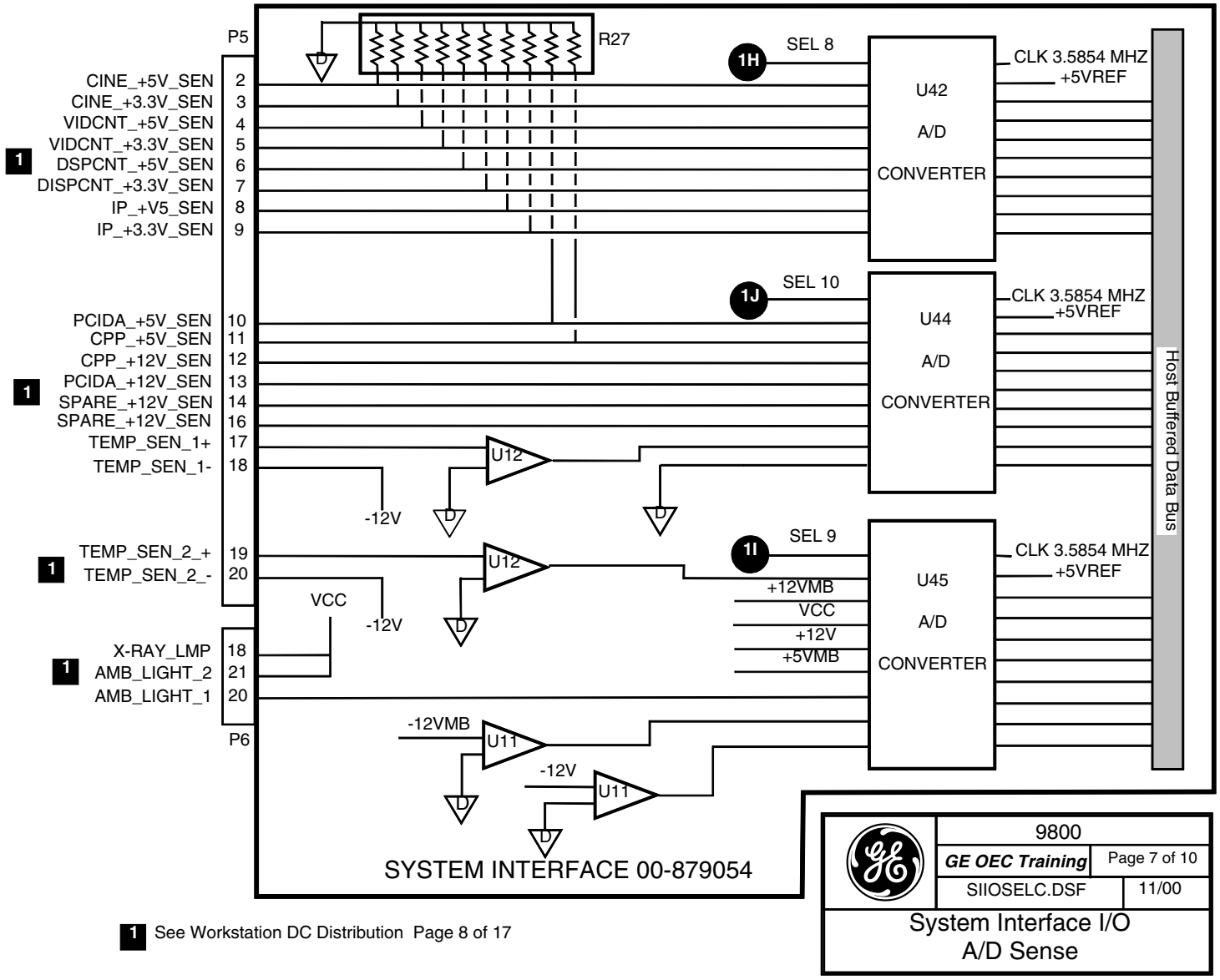
System Intrface I/O External Cable ID	

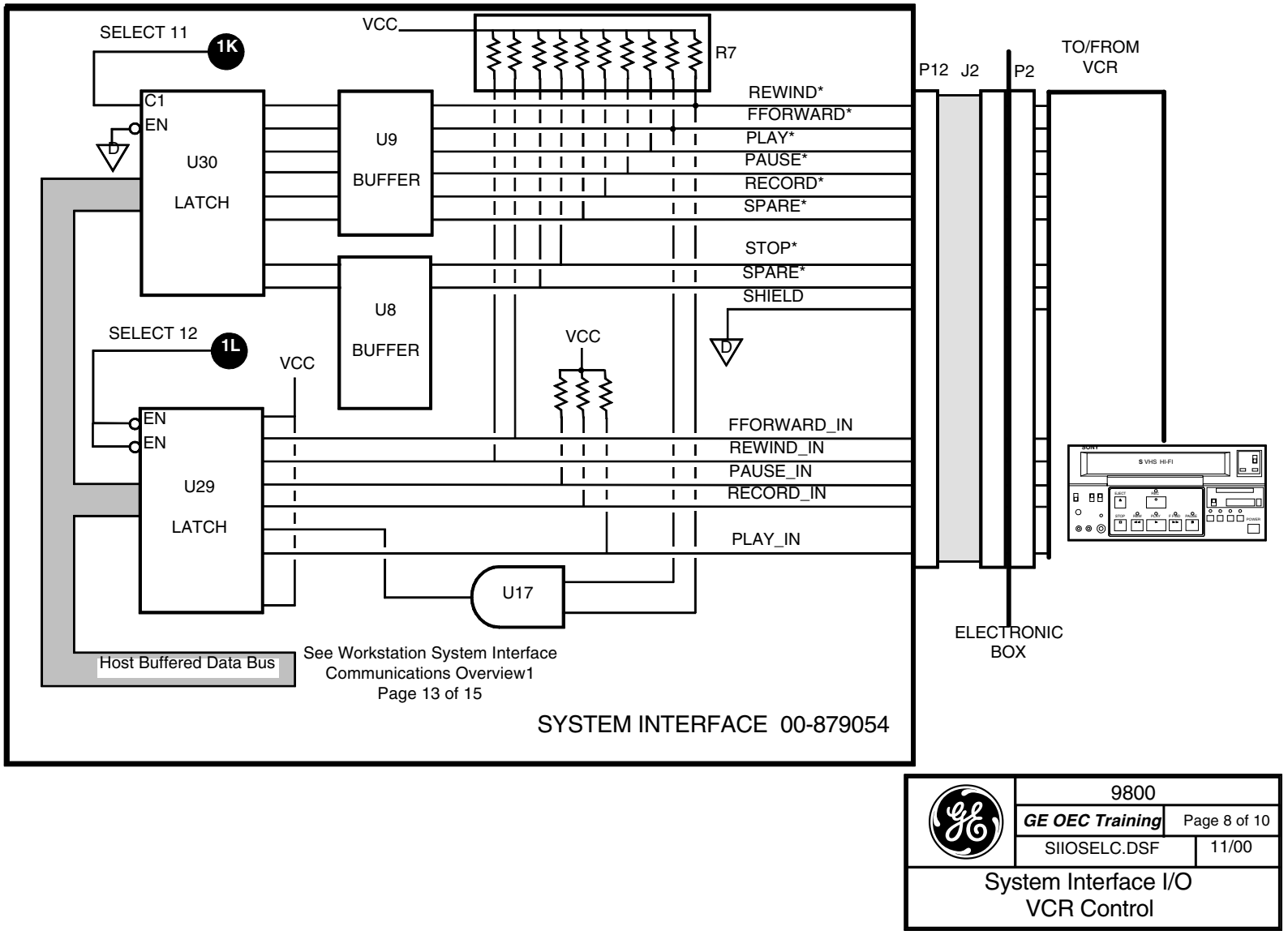
Functional Block 48 – System Interface I/O External Cable ID (5 of 10)



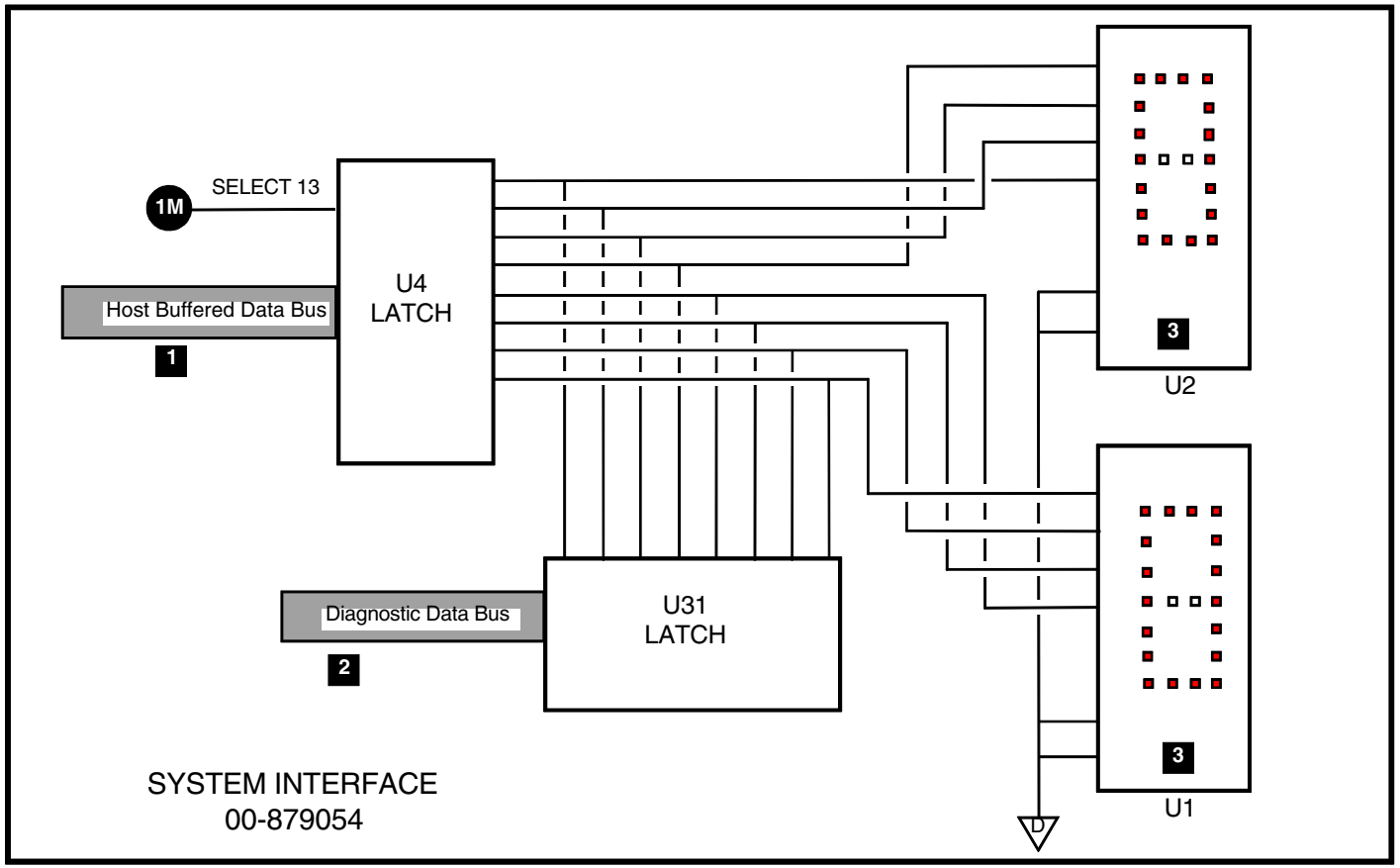
Functional Block 49 – System Interface I/O DS1, DS2 Diagnostic LEDs (6 of 10)



Functional Block 50 – System Interface I/O A/D Sense (7 of 10)



Functional Block 51 – System Interface I/O VCR Control (8 of 10)



1 See Workstation System Interface Communications Overview 1 page 13 of 15

2 See Workstation System Interface Communications Overview 2 page 14 of 15

3 00 code is displayed on U2, U1 during normal operation.

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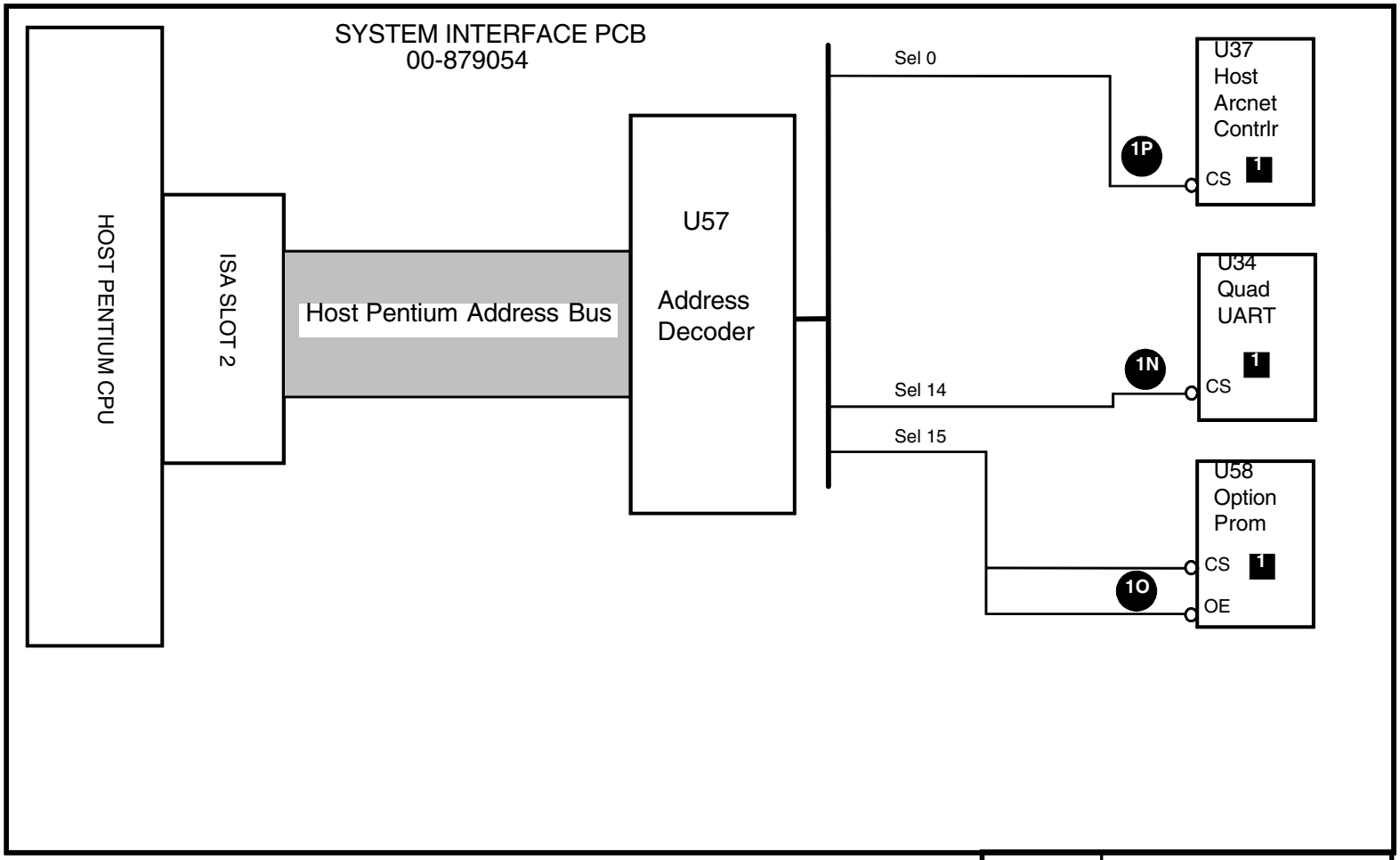
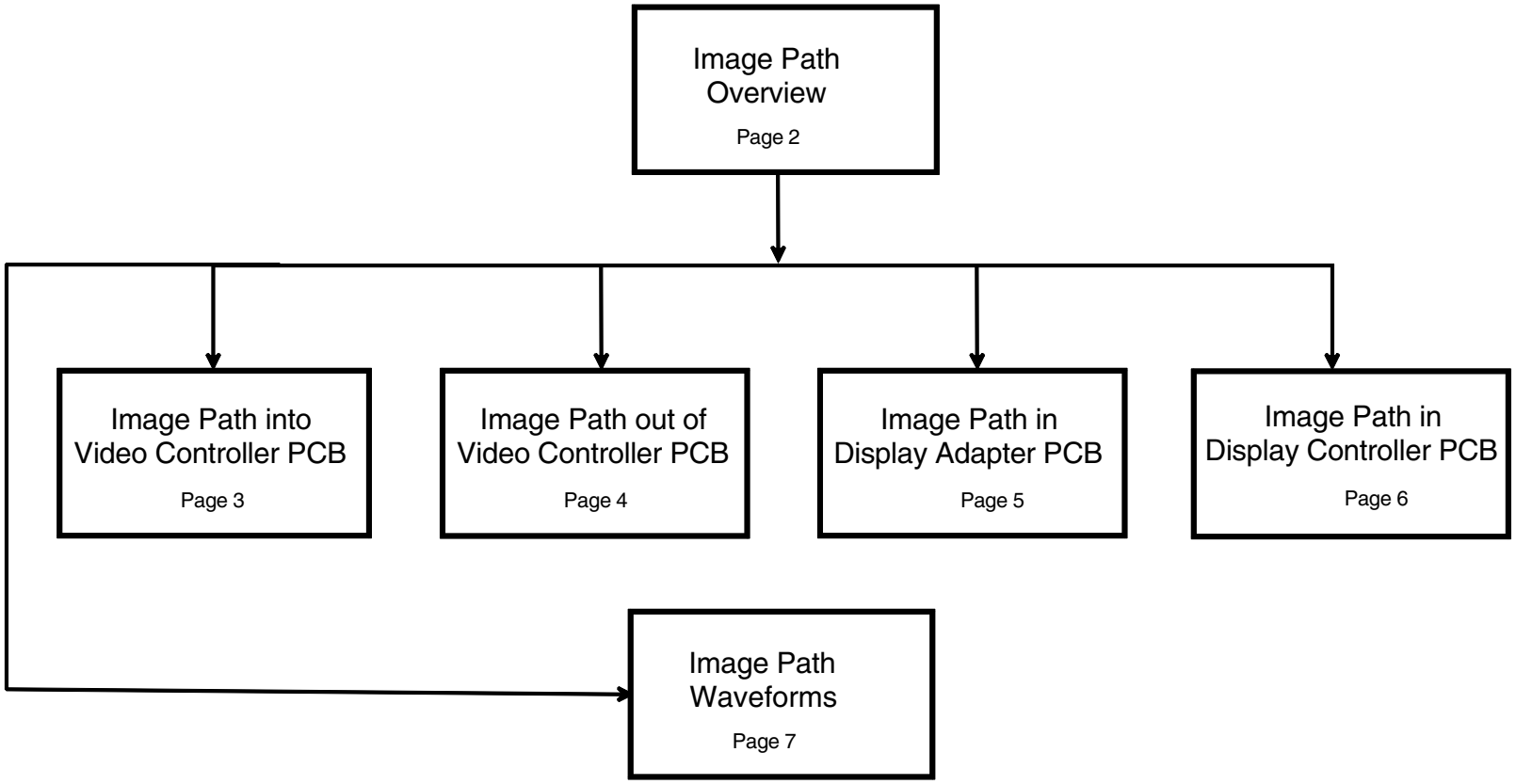
System Interface I/O
U1, U2 Diagnostic Display

Functional Block 52 – System Interface I/O U1, U2 Diagnostic Display (9 of 10)



Functional Block 53 – System Interface I/O ARCNET, Quad UART, Option PROM (10 of 10)



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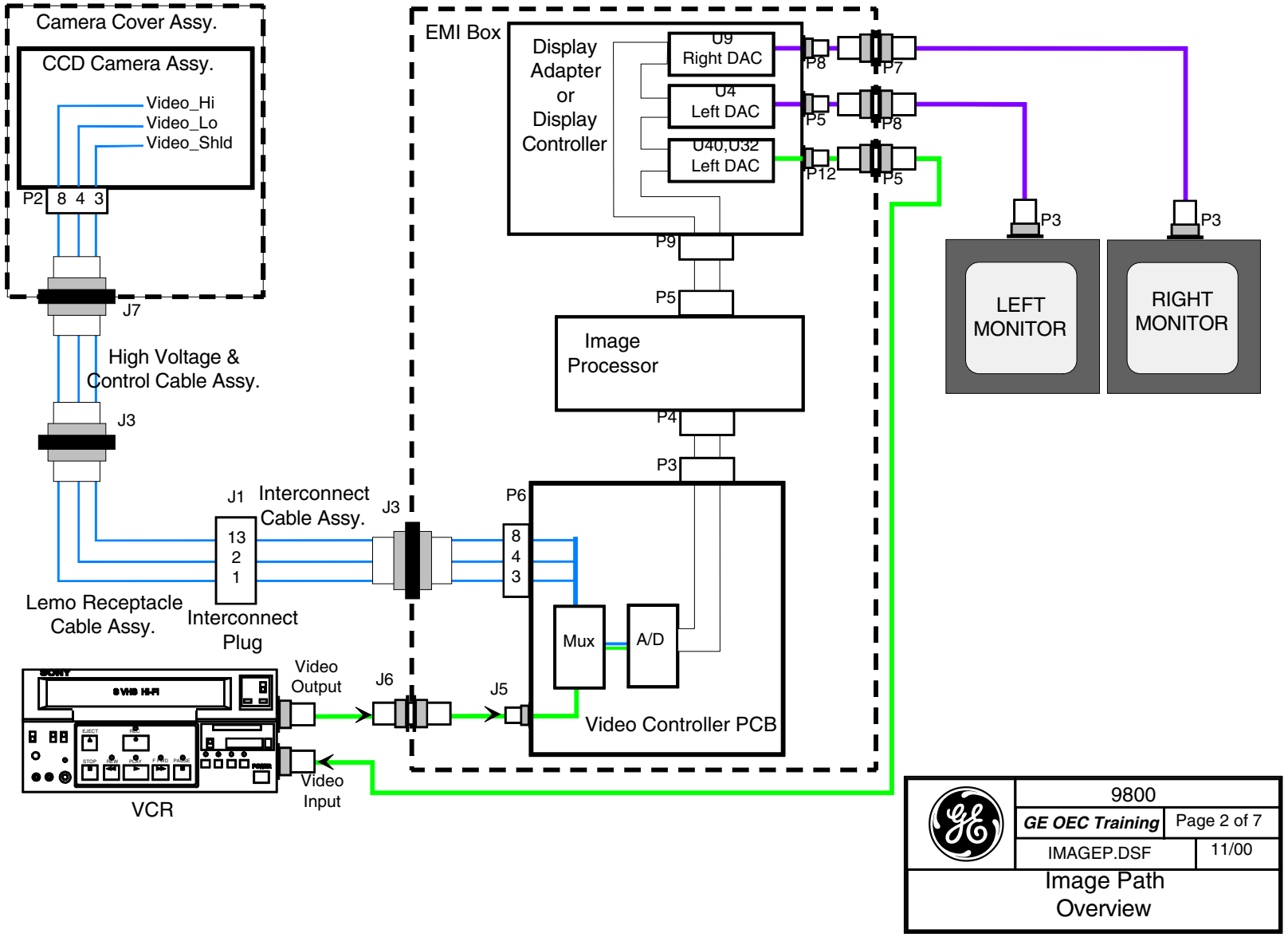
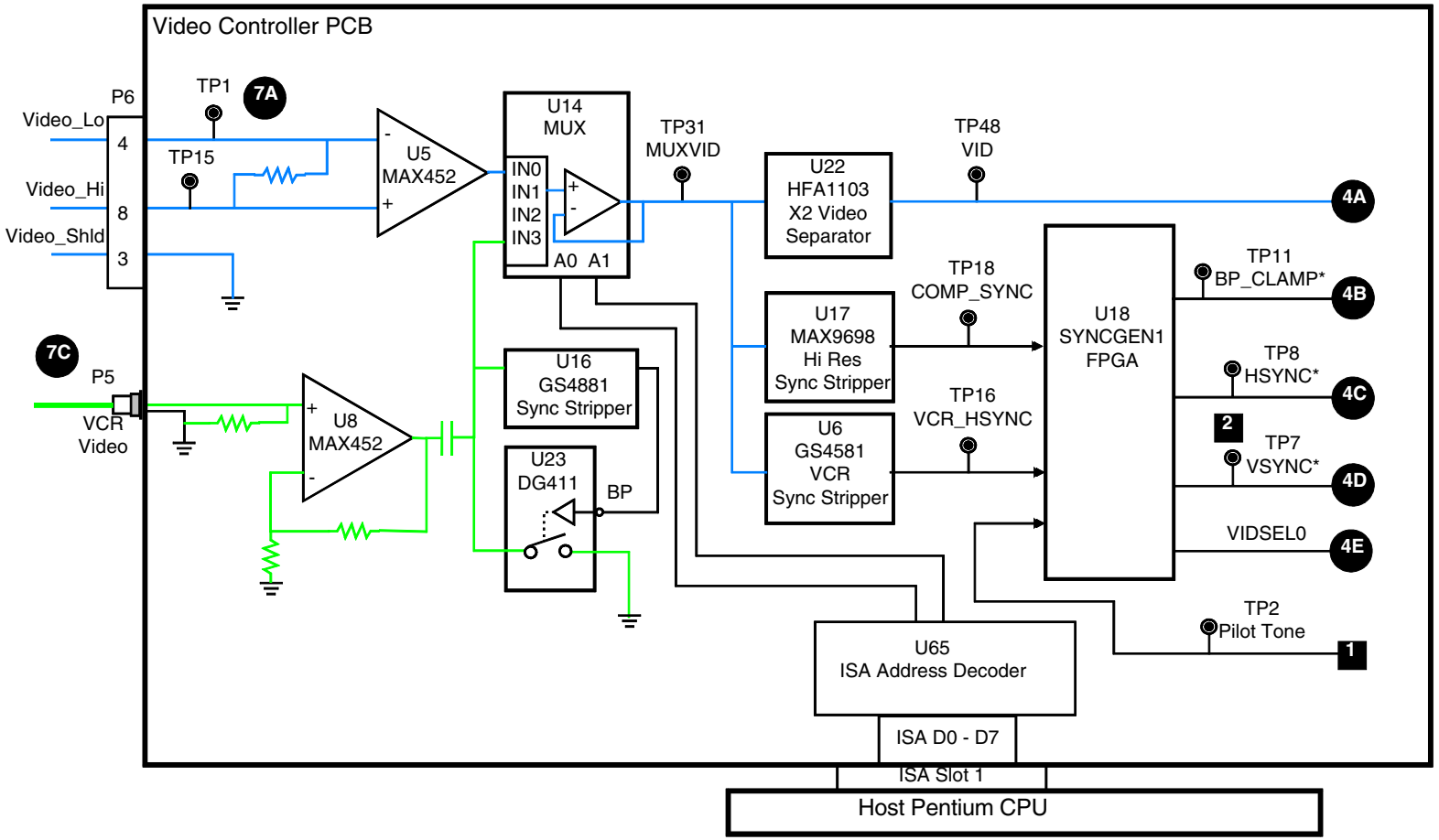
	GE OEC Training | Page 1 of 7
	IMAGEP.DSF | 11/00
Image Path Functional Diagram Map	

Functional Block 54 – Image Path (1 of 7)



Functional Block 55 – Image Path Overview (2 of 7)



1 See Pilot Tone Functional Diagram page 1 of 1.

2 See Frame Sync Functional Diagram page 1 of 2.

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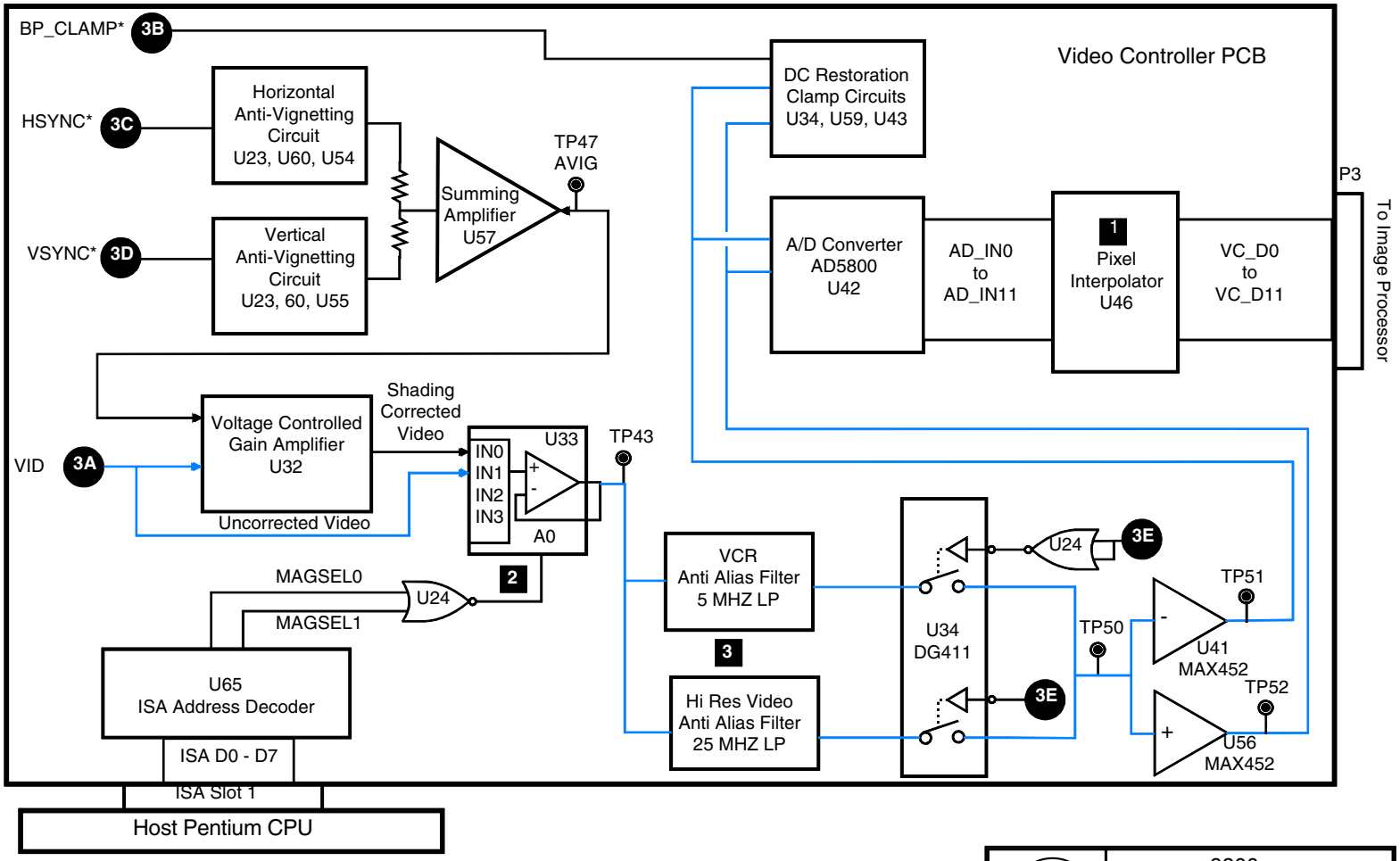
IMAGEP.DSF	11/00
Image Path into Video Controller PCB	

Functional Block 56 – Image Path Info Video Controller PCB (3 of 7)



1 Interpolates value of low scan VCR video to high scan format.

2 Shading corrected video is applied in Normal image tube field size.
Uncorrected video is applied in Mag 1, Mag 2 image tube field size.

3 25 mHz filter is used when aquiring video during X-Rays.
5 mHz filter is used when reviewing video from a VCR.

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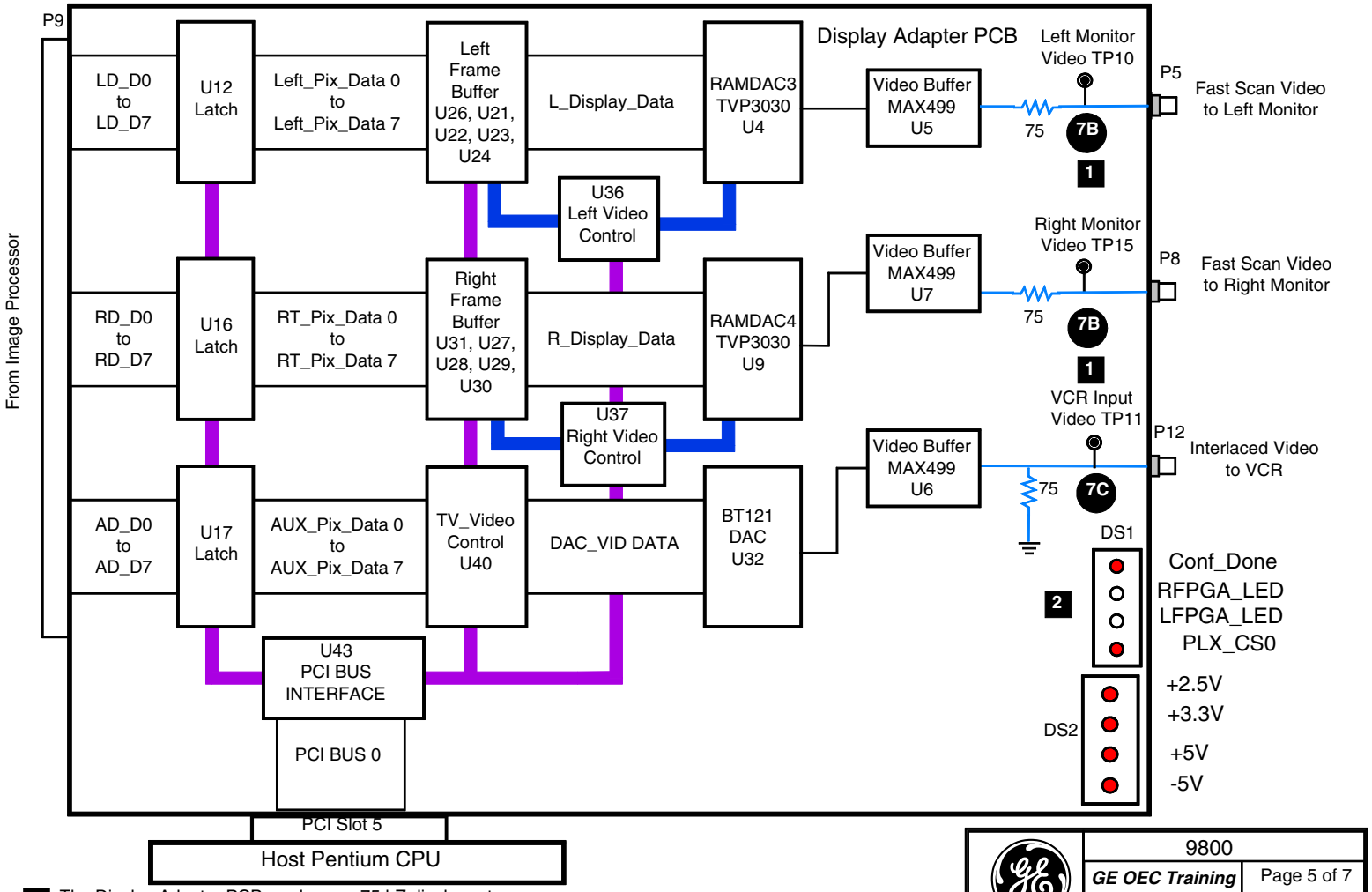
	GE OEC Training Page 4 of 7
	IMAGEP.DSF 11/00
Image Path out of Video Controller PCB	

Functional Block 57 – Image Path out of Video Controller PCB (4 of 7)



1 The Display Adapter PCB produces a 75 hZ display rate.

2 Conf_Done and PLX_CS0 LED's on DS1 lit during normal operation.
RFPGA_LED and LFPGA_LED blink occassionaly during normal operation.

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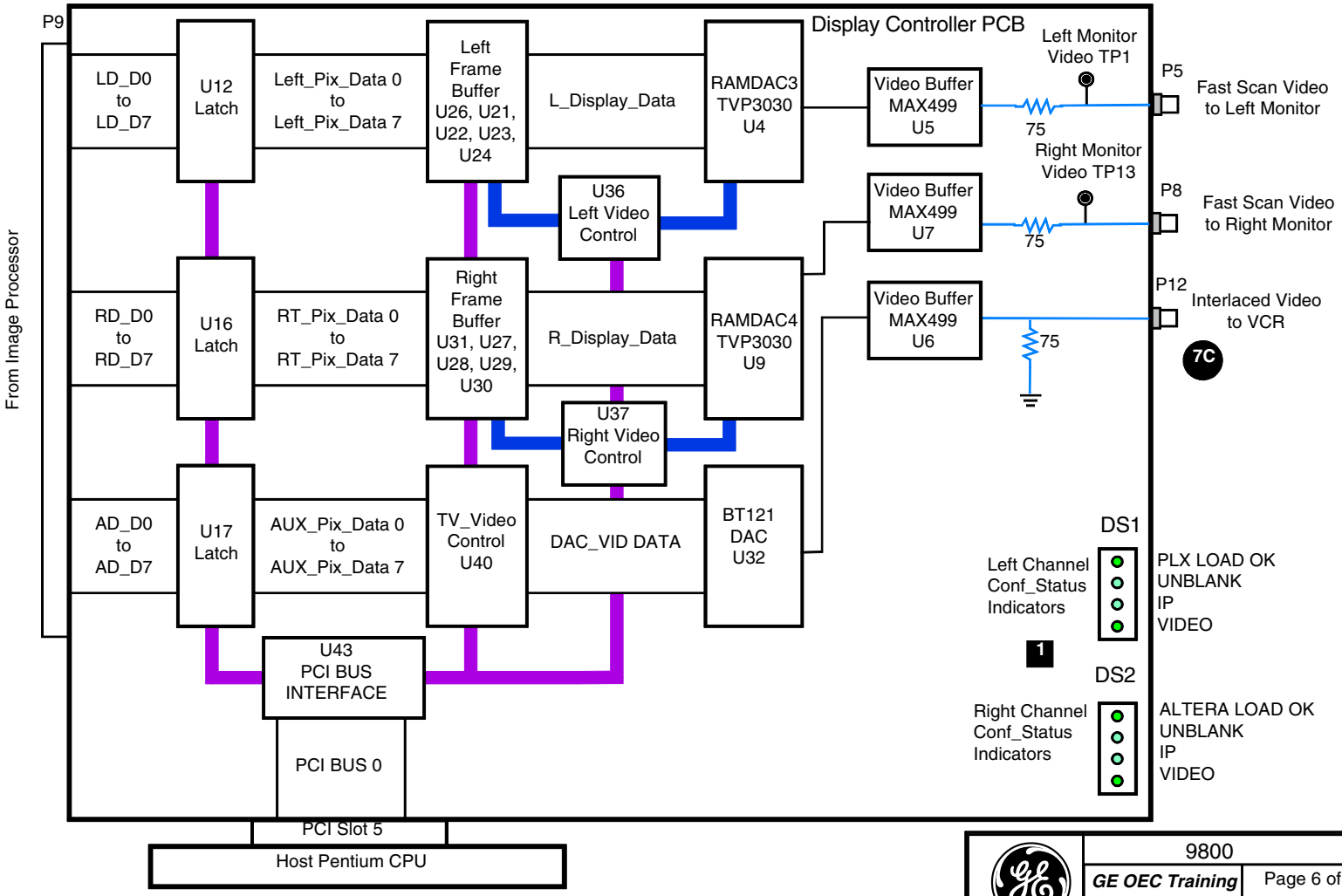
	GE OEC Training — Page 5 of 7
	IMAGEP.DSF — 11/00
	Image Path in Display Adapter PCB

Functional Block 58 – Image Path in Display Adapter PCB (5 of 7)



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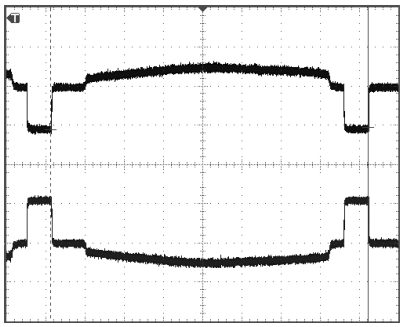
IMAGEP.DSF	11/00
Image Path in Display Controller PCB	

1 The following LED's are normally on indicating proper operation of the control cirucuits:
PLX_LOAD OK< ALTERA LOAD OK, VIDEO.
The UNBLANK and IP LED's blink during normal operation.

Functional Block 59 – Image Path in Display Controller PCB (6 of 7)



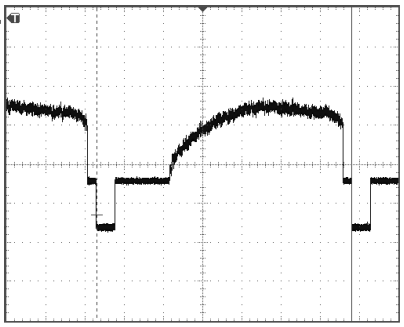
9800 Camera Video Horizontal Rate

30.9kHz
32.36us

3A

Ch 1 500 mV Ch 2 500mV M 4.00us

30 frames/sec X 1030 lines/frame = 30900 lines/sec = 30.9kHz



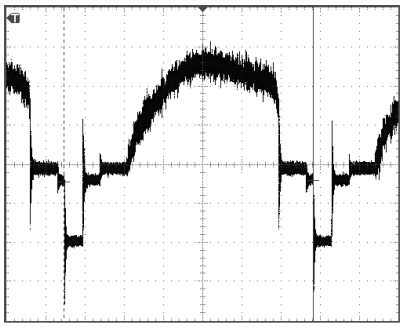
9800 Monitor Video Horizontal Rate

77.25kHz
12.94us

5B

Ch 1 500mV M 2.00us

75 frames/sec X 1030 lines/frame = 77250 lines/sec = 77.25kHz



9800 RS-170 Video Horizontal Rate

15.75kHz
63.5us

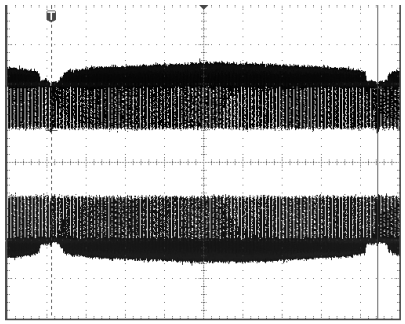
3C

5C

6C

Ch 1 200mV M 10.0us

30 frames/sec X 525 lines/frame = 15750 lines/sec = 15.75kHz



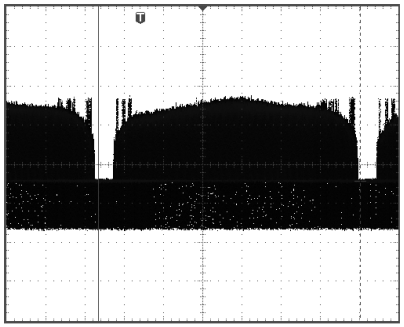
9800 Camera Video Vertical Rate

30Hz
33.33ms

3A

Ch1 500mV Ch2 500mV M 4.00ms

30 frames/sec X 1 field/frame = 30 fields/sec = 30Hz



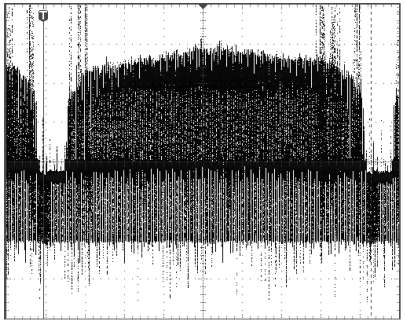
9800 Monitor Video Vertical Rate

75Hz
13.33ms

5B

Ch 1 500mV M 2.00ms

75 frames/sec X 1 field/frame = 75 fields/sec = 75Hz



9800 RS-170 Video Vertical Rate

60Hz
16.67ms

3C

5C

6C

Ch 1 200mV M 2.00ms

30 frames/sec X 2 fields/frame = 60 fields/sec = 60Hz

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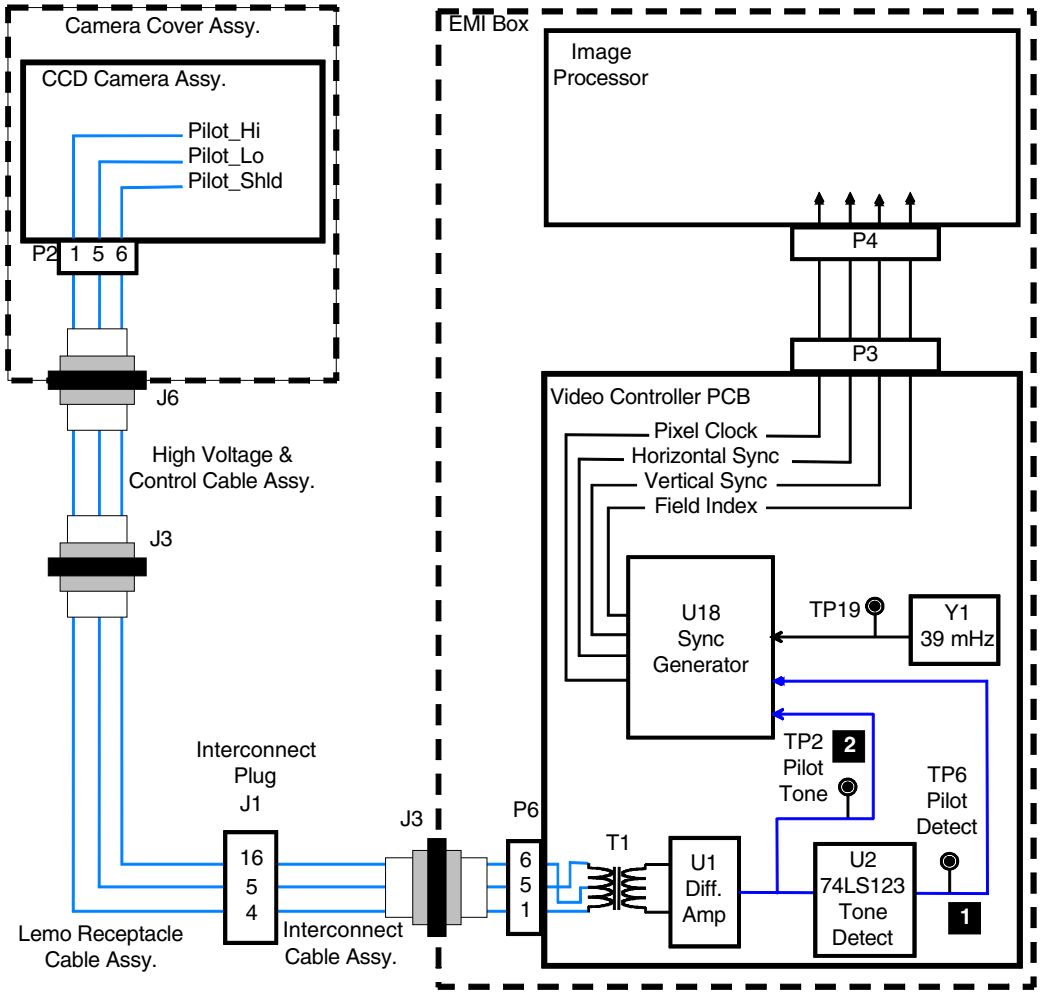
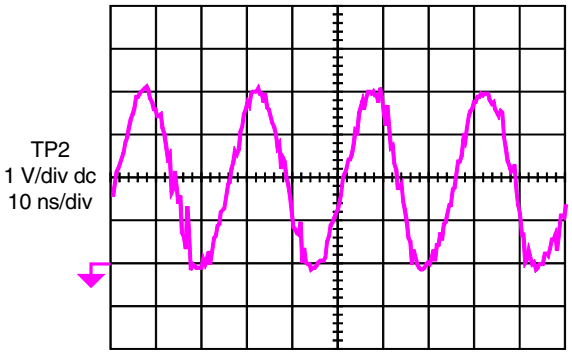
Image Path Waveforms		

Functional Block 60 – Image Path Waveforms (7 of 7)





1 TP6 is high (4.5 V) when Pilot Tone is detected.
TP6 is low (.5 V) when Pilot Tone is not detected.
If no Tone is detected Y1 provides the timing signal.

2 See Image Path into Video Controller PCB Functional Diagram page 3 of 7.

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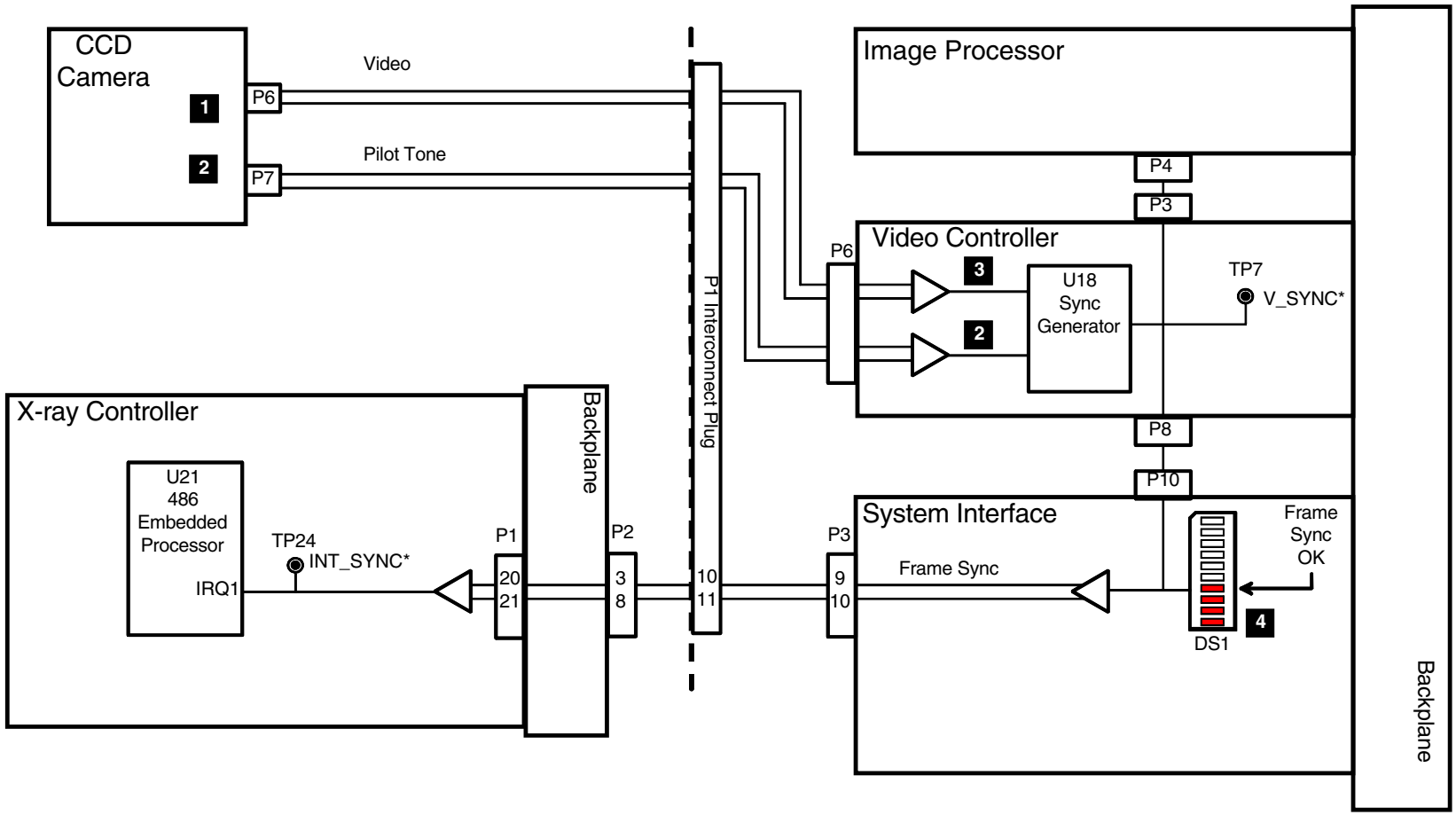
Pilot Tone Functional Diagram	

Functional Block 61 – Pilot Tone (1 of 1)



1 See Image Path Overview Functional Diagram page 2 of 7.

2 See Pilot Tone Functional Diagram page 1 of 1.

3 See Image Path into Video Controller PCB Functional Diagram page 3 of 7.

4 See System Inteface I/O DS1, DS2 Diagnostic LEDs Functional Diagram page 6 of 10.

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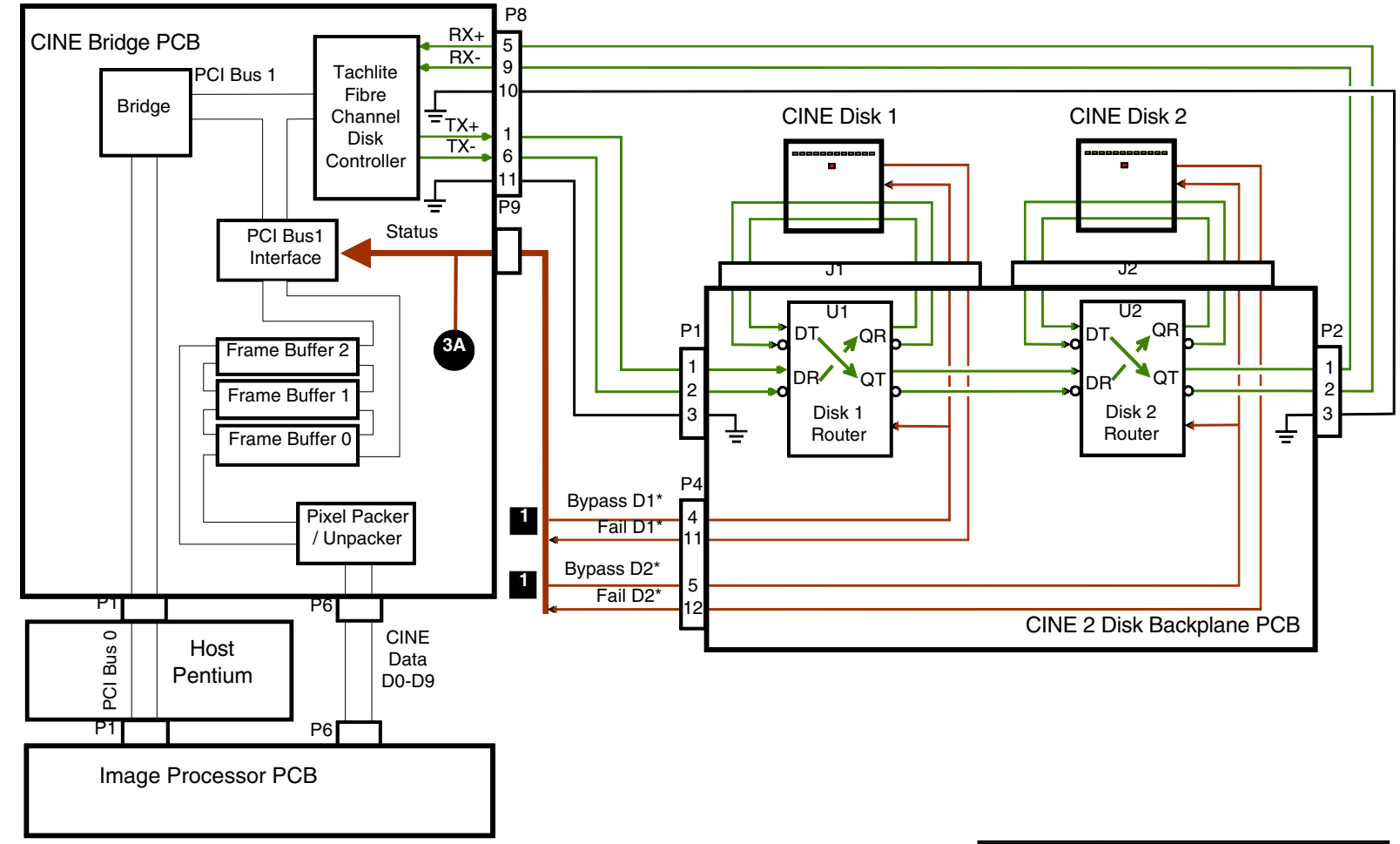
Frame Sync Functional Diagram	

Functional Block 62 – Frame Sync (1 of 1)



1 Bypass L= DR → QT (Failed Condition)
Bypass H= DT → QT (Normal Condition)

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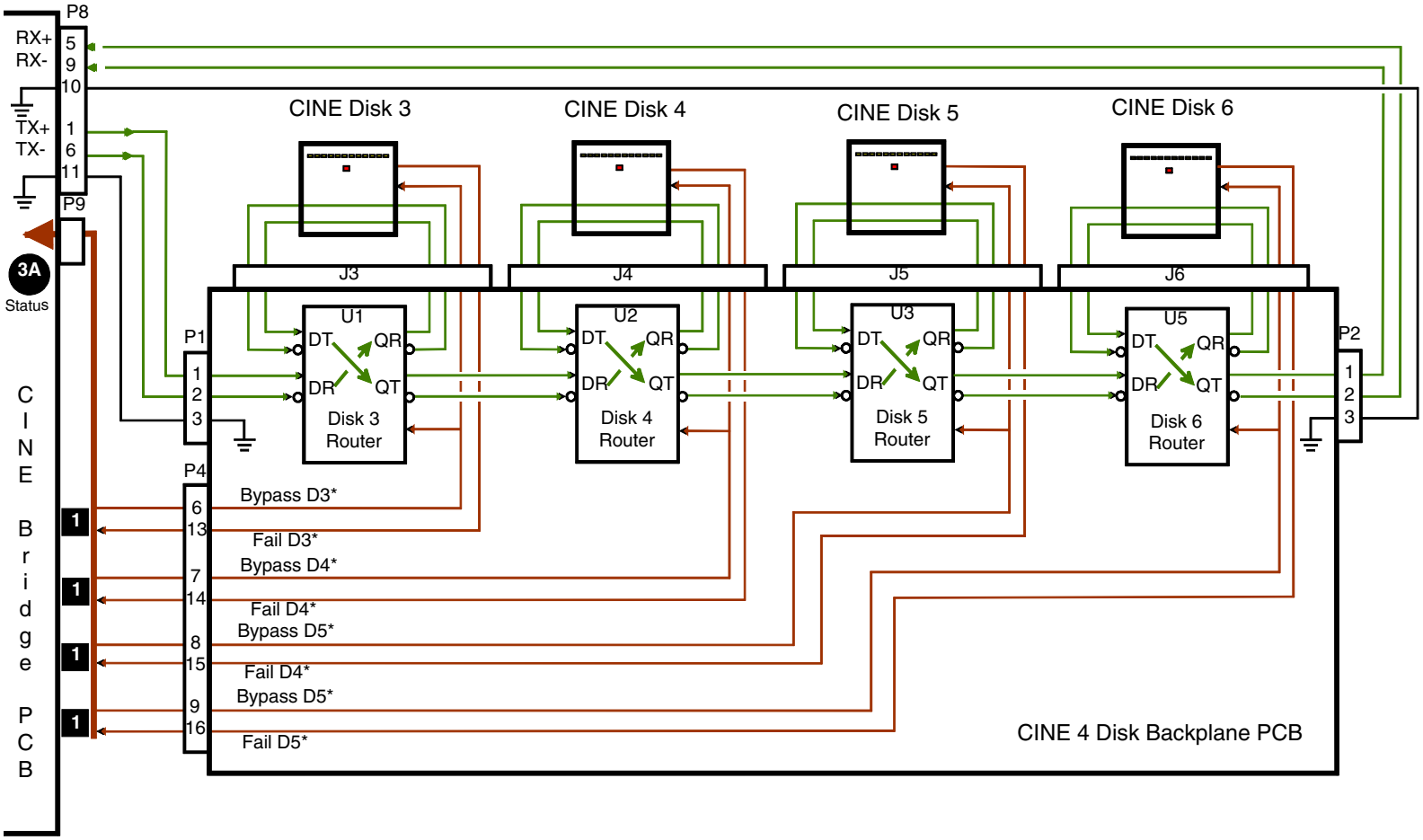
	CINE Option with CINE 2 Disk Backplane

Functional Block 63 – CINE Option with CINE 2 Disk Backplane (1 of 3)



1 Bypass L= DR→ QT (Failed Condition)
Bypass H= DT→ QT (Normal Condition)

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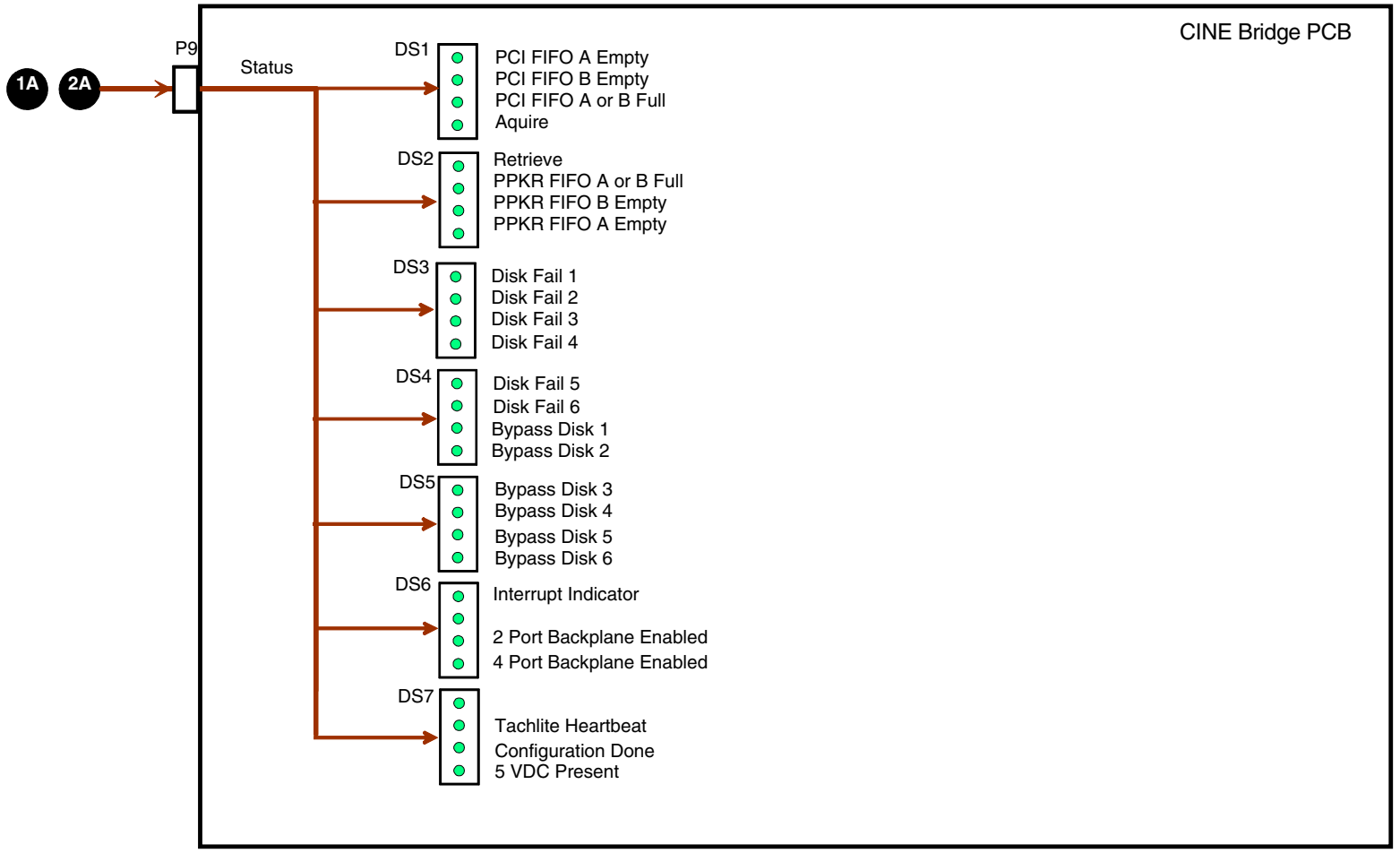
CINE.DSF	11/00
CINE Option with CINE 4 Disk Backplane	

Functional Block 64 – CINE Option with CINE 4 Disk Backplane (2 of 3)



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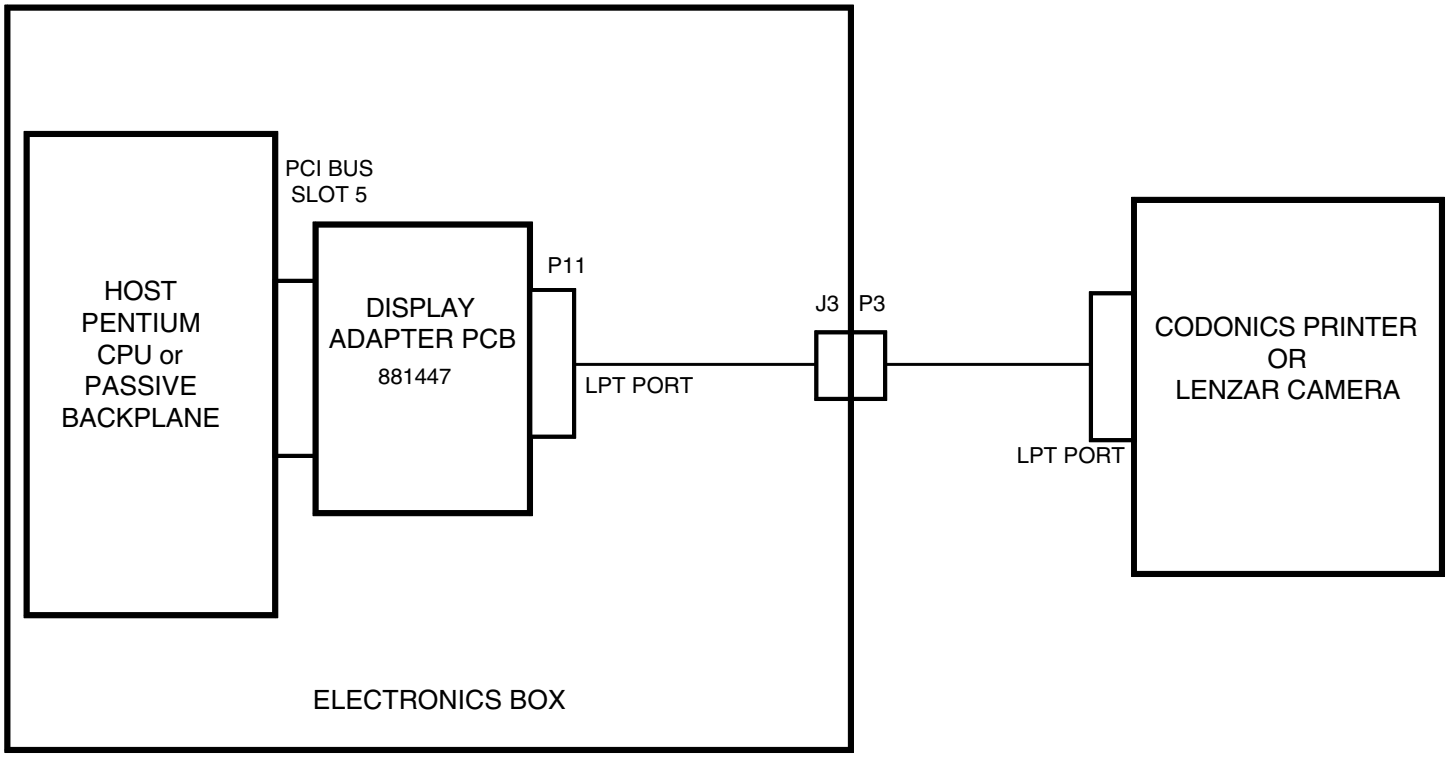
CINE Bridge PCB Diagnostic LED's		

Functional Block 65 – CINE Bridge PCB Diagnostic LEDs (3 of 3)



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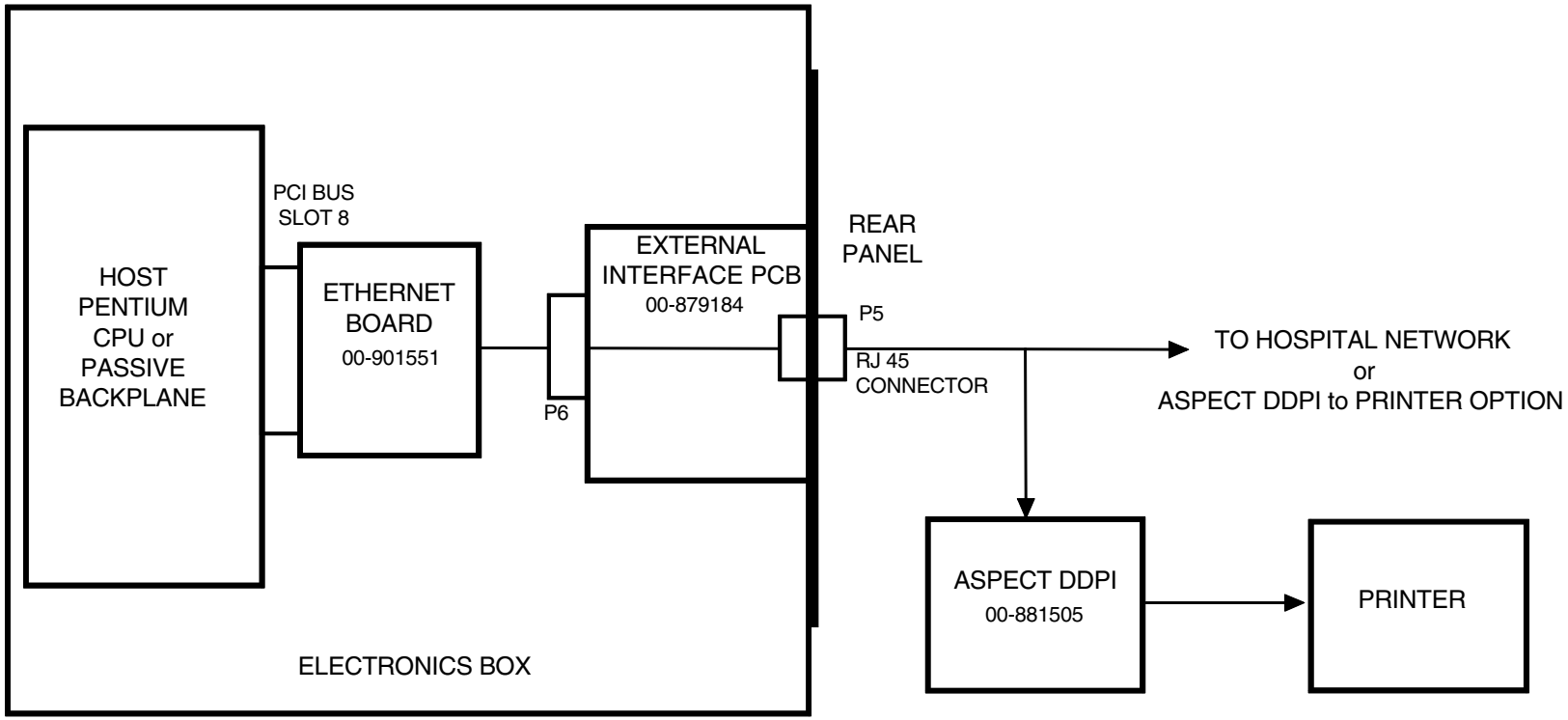
COD_LENZ.DSF	11/00
Codonics Printer/Lenzar Camera Functional Diagram	

Functional Block 66 – Codonics Printer/Lenzar Camera (1 of 1)



The Aspect DDPI (Direct Digital Printer Interface) receives DICOM information print as an input and supplies a standard 3M M952 or P831, or Kodak KCL digital print output

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DICOM/DDPI Functional Diagram		

Functional Block 67 – DICOM/DDPI (1 of 1)